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BIRDWOOD CLAY AND SILICA QUARRY

GEOLOGICAL REPORT

Submitted by
Newbold General Refractories Ltd
1975

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Government of South Australia
Primary Industries and Resources SA

Pg A

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REPORT:

NICHOL, D. 1975

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NEWBOLD GENERAL REFRACTORIES LTD

RAW MATERIALS DIVISION

BIRDWOOD CLAY AND SILICA QUARRY

Sections 1 and 6397, Hundred of Talunga, County of Adelaide

BY

DOUGLAS NICHOL

GEOLOGIST

October 20, 1975

S.A. Clay Deposits

Report No. 6

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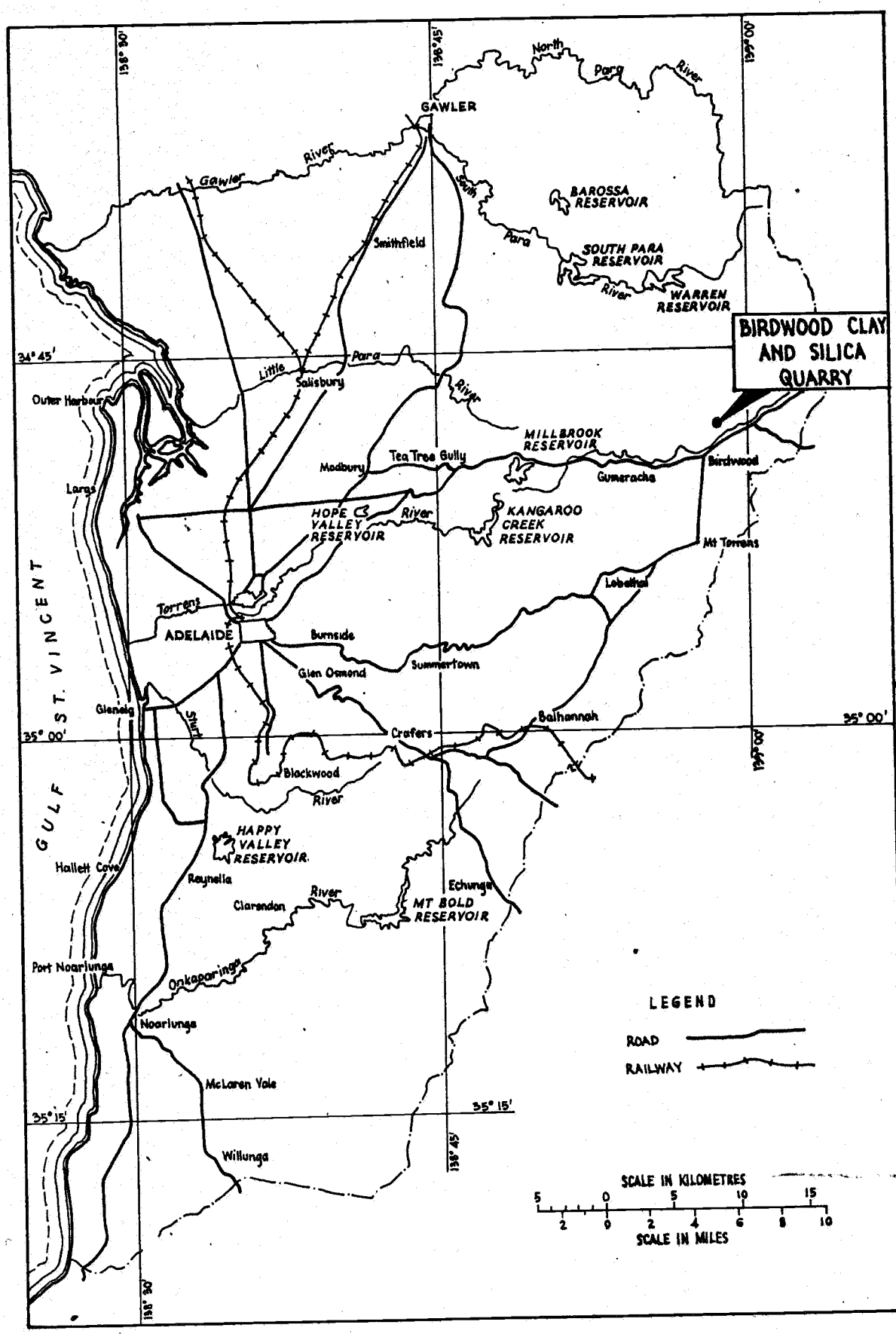

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BIRDWOOD CLAY AND SILICA QUARRY ORIENTATION PLAN			
COMPILED: D. Nichol.	DRAWN: J.A.H.	SCALE: 1:400,000	SHEET No: S 26
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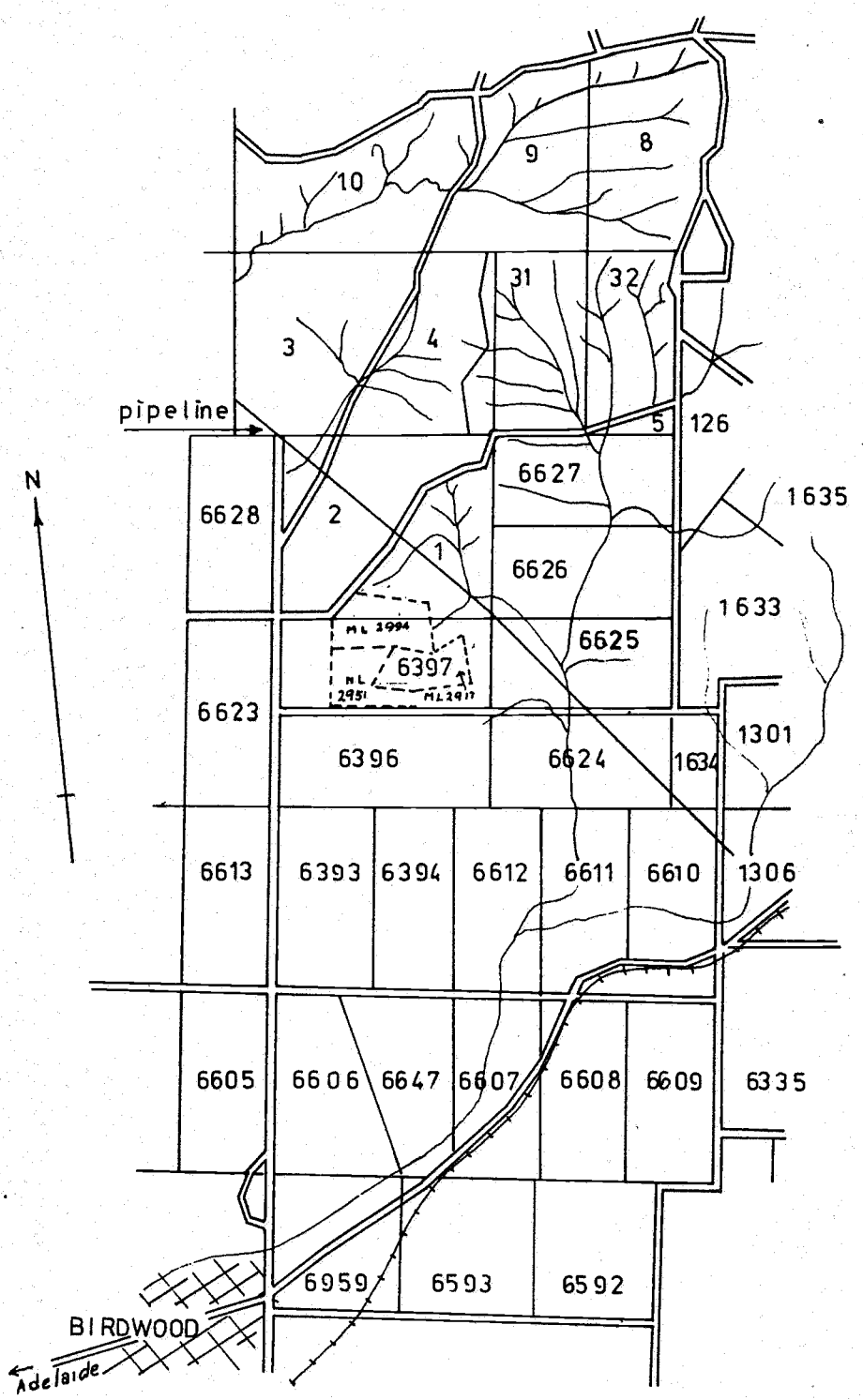
LOCALITY PLAN



1" = 40 CHS

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BIRDWOOD CLAY AND SILICA QUARRY ORIENTATION PLAN			
COMPILED: D. Nichol.	DRAWN: J.A.H.		SHEET No: S 266
DATUM: —	DATE: 22 Sept. 1975	CHECKED:	

NEWBOLD GENERAL REFRACTORIES LTD

RAW MATERIALS DIVISION

S.A. Clay Deposits
Report No. 6

BIRDWOOD CLAY AND SILICA QUARRY

Section 1 and 6397, Hundred of Talunga, County of Adelaide

ABSTRACT

Argillite and quartzite in Saddleworth Formation (Burra Group) of Adelaidean age altered during a Tertiary deep weathering cycle, are excavated for refractory and other raw materials near Birdwood in the Mount Lofty Ranges, S.A.

From 1971 to 30 June 1975, recorded production totals 35,555 tonnes of white clay-shale for fireclay, white clay and kaolin and 30,635 tonnes of decomposed quartzite for refractory silica and road construction material.

Fireclay alumina content on a calcined basis ranges from 18.0 per cent to 46.2 per cent and averages 37.0 per cent. Softening Point and Fusion Point average 1710°C and 1730°C respectively.

Kaolin is yellowish-white and below ceramic and paper filler grades. Investigation of treatment methods to improve colour is required.

Evaluation of washed silica as an industrial milled product is warranted.

A core drilling programme of 22 holes totalling 908 metres, sampling and geological mapping provide a basis for defining quarry limits.

Within a proposed quarry development plan 3.89 million tonnes of white clay-shale and 4.25 million tonnes of decomposed quartzite are available.

Location: 3 kilometres north of Birdwood and 48 kilometres northeast of Adelaide in sections 1 and 6397, hundred of Talunga, county of Adelaide (see Plans S26, S26b and S23).

INTRODUCTION

Birdwood clay and silica quarry supplies raw material to Newbold General Refractories Ltd. - Beverley brickworks, Jarvis Industries P/L and other companies.

This report presents geological data to provide a basis for future quarry design and development.

Fieldwork was carried out by the writer intermittently from January 1975 to August 1975. Drilling programme from February 1974 to August 1974 was supervised by J.H. Callender, Manager, Raw Materials Division.

Geological drillhole logs and analytical data are presented in the appendices.

Access to the quarry is by 0.3 kilometres of graded track which junctions east from graded Cromer Road at distances of 2.9 kilometres north of Birdwood and 0.1 kilometres south of Lucky Hit Road intersection (see plan No. S23).

MINING TENEMENTS

Details of mining tenements held by Newbold General Refractories Ltd and other companies are summarised on plan No. S23.

Section 6397, hundred of Talunga is gazetted a Temporary Timber Reserve controlled by the Director of Lands, S.A. Lands Department whose permission is required to clear and remove timber.

Birdwood clay and silica quarry is situated within the Adelaide Outer Metropolitan Planning Area which is under Interim Development Control.

HISTORICAL BACKGROUND AND PREVIOUS INVESTIGATIONS

From before 1870, section 6397, hundred of Talunga was mined for gold. From Lucky Hit, the best known mine, Brown (1908) reports that 344.2 tonnes of gold ore consigned for treatment to the Government works yielded 9.43 kilograms of gold. Average grade of the ore consigned is a high 27.4 grammes/tonne (p.p.m.).

Clay mining by the South Australian Portland Cement Co. Ltd. began before 1938 and the operations were later taken over by Jarvis Industries P/L. In 1967 the deposit was acquired by Newbold General Refractories Ltd.

The first geological mapping was carried out by Ridgway (1951) who inspected underground workings, drilled 5 coreholes and outlined the geology. Later

inspections and reserve calculations are described in Ridgway (1953).

Wade (1954) mapped all existing workings, prepared a surface contour plan and recalculated reserves.

* Company investigations by Oliver 1966 and Steffen 1967 that recommended purchase of deposits have been omitted.

In 1966, Newbold General Refractories Ltd. retained the S.A. Department of Mines to perform a diamond drilling programme of seven holes and compile available unpublished geological data (Tarvydas, 1971).

A reconnaissance geological survey of the Birdwood district is reported by Barnett (1972).

The geological plans accompanying this report incorporate results of these previous investigations.

PRODUCTION

Newbold Raw Materials Division manage and supervise all aspects of quarrying. Operations are conducted during dry summer months when clay moisture content is low, and products are stockpiled on a stockpile pad. This procedure ensures all year access to consistent raw material supplies.

The raw materials produced from the quarry are summarised in Table A.

Production for the period from 1971 to 30 June 1975 is detailed in Table B.

Table A : Birdwood Clay and Silica Quarry - Raw Material Products

Rock Type	Product	Specification	Customer	Use
White clay-shale	fireclay	>37% Al_2O_3	N.G.R. Beverley brickworks	refractory bricks
White clay-shale	white clay	white colour	S.A. Portland Cement Co. Ltd.	white cement
White clay-shale	K1 kaolin	kaolinite	Jarvis Industries P/L	milled kaolin
White clay-shale	K2 kaolin	white kaolinite	Jarvis Industries P/L	milled white kaolin
decomposed quartzite	silica	clean	N.G.R. Beverley brickworks	refractory bricks
decomposed quartzite	rubble	none	District Council Gumeracha	road construction

TABLE B : Birdwood Clay and Silica Quarry - Production 1971 - 1975 (tonnes)

Product \ Year	1971	1972	1973	1974	½ year to 30 June 1975	TOTAL
fireclay	4,268	1,955	1,876	3,291	1,500	12,890
white clay	3,094	5,456	4,960	4,269	3,261	21,040
K1 kaolin	-	-	56	503	247	806
K2 kaolin	-	-	64	755	-	819
refractory silica	2,453	1,087	1,109	1,531	1,522	7,702
rubble	1,529	450	9,573	7,534	3,847	22,933
TOTAL	11,344	8,948	17,638	17,883	10,377	66,190

GEOLOGICAL SETTING

Regional geology is shown on ADELAIDE (Thomson, 1969) and described in Parkin (1969).

The Birdwood district situated in the central Mount Lofty Ranges is characterised by low rounded hills.

Bedrock comprises Burra Group rocks of Adelaidean (Torrensian) age consisting of argillites with minor quartzites and Kanmantoo Group rocks of Cambrian age consisting of mica schists. (see Plan No. S23).

Birdwood clay and silica quarry is excavated in the Saddleworth Formation within the Burra Group and near the Adelaidean - Cambrian unconformity.

Bedrock was folded and metamorphosed during the Lower Palaeozoic Delamerian Orogeny. The regional structural trend is north-south and at Birdwood strata dip eastwards.

Micaceous pegmatite dykes, quartz veins and barite veins are developed near Birdwood.

During the Tertiary period, deep weathering converted hard argillites to soft white clay-shales for up to 50 metres below the weathering surface.

Younger alluvial and slope deposits and soil units are widespread.

SITE GEOLOGY

Topography

Topography of the quarry area is shown on plan No. G143, No. G144a and No. G144b.

Undulating slopes fall gently westwards. Run-off drains westwards.

Section 6397 supports thick natural vegetation and section 1 to the north is used for grazing purposes.

Rock Types

Birdwood clay and silica quarry is excavated in argillites and quartzites of the Saddleworth Formation of Adelaidean age which have been altered and decomposed by deep weathering processes during the Tertiary period. The distribution of the various lithologies is shown on plan No. G143.

Argillites consist of metasedimentary schists, phyllites, silty slates and aluminous slates, altered, kaolinised and bleached to white and pale coloured clay-shales which range from kaolinite (silt free) through fireclay (low silt) to white clay (silty). Argillites below the weathering profile and underlying white clay-shales are red-brown and grey-brown in colour. The contact between white clay-shale and red-brown argillite exposed in the quarry drain is sharp and discordent with respect to bedding. Relict bedding in white clay-shale is evident in compositional and textural banding. Thin veins of kaolinitic material cut across bedding.

White clay-shale is overlain by friable weathered quartzite which has decomposed by destruction of grain boundaries. The quartzite ranges from white to pale yellow-brown in colour and thin- to thick-bedded in form and consists mainly of silica with minor mica and heavy minerals. Brown iron staining is common in the near surface zone. The quartzite appears to thicken in the vicinity of the quarry.

Relatively unaltered rocks comprising shales with minor sandstone and quartzite interbeds, crop out on the eastern side of the map area and overlie the main quartzite unit.

Overburden, up to 4 metres deep comprises brown plastic pebbly clay, alluvium and soil units.

Structure

White clay-shale and quartzite are folded into a structural terrace which contains a saucer shaped depression. Quartzite occupies the core of the depression. Highest quality white kaolinite (K_2) is associated with the structural high rimming the saucer shaped depression.

White clay-shale subcrops along the western and northern flanks of the structural terrace.

Structural terraces are an uncommon tectonic feature in the Mount Lofty

Ranges. The structural history of the terrace is not yet resolved, however it may be a tectonic response to increased thickness of quartzite developed within the succession.

Drilling programme

A core drilling programme of 22 holes totalling 908.08 metres has been completed. Drillhole locations on a grid basis are shown on plan No. G143 and geological logs are included in Appendix A. Drillhole intersections are summarised in Table C and shown on cross-sections on plan No. G144a and No. G144b.

Table C : Birdwood Clay and Silica Quarry - Summary of drilling programme

Hole No	Overburden		Slate		Quartzite		White clay-shale		Schist		Total depth drilled (metres)
	from	to	from	to	from	to	from	to	from	to	
DHA1	-	-	-	-	-	-	0	20.3	-	-	20.30
DHA2	-	-	-	-	-	-	0	16.8	-	-	16.80
DHB2	-	-	-	-	-	-	20.6	32.9	32.9	57.34	57.34
DHB3	0	3.7	-	-	3.7	23.0	23.0	29.2	29.2	49.22	49.22
DHB4	0	3.8	-	-	3.8	16.1	16.1	48.0	-	-	48.00
DHB5	-	-	-	-	0	21.5	21.5	47.29	-	-	47.29
DHB6	0	1.8	1.8	16.3	16.3	19.9	-	-	-	-	19.90
DHC1	0	2.0	-	-	-	-	2.0	38.6	38.6	41.65	41.65
DHC2	-	-	-	-	0	9.9	9.9	35.57	-	-	35.57
DHC3	-	-	-	-	0	29.0	29.0	50.35	-	-	50.35
DHC4	0	3.4	-	-	3.4	33.5	33.5	47.19	-	-	47.19
DHC5	-	-	-	-	0	40.15	-	-	-	-	40.15
DHC6	-	-	0	32.2	-	-	-	-	-	-	32.20
DHD2	0	1.5	-	-	-	-	1.5	33.0	33.0	43.7	43.70
DHD3	0	2.5	-	-	-	-	2.5	36.5	36.5	44.9	44.90
DHD4	0	1.9	-	-	-	-	-	-	1.9	44.7	44.70
DHD5	0	1.6	1.6	10.0	10.0	30.7	30.7	35.0	35.0	41.19	41.19
DHE1	0	2.0	-	-	-	-	-	-	2.0	50.7	50.70
DHE2	0	1.2	-	-	-	-	-	-	1.2	49.5	49.50
DHE3	0	1.4	-	-	-	-	1.4	12.0	12.0	48.7	48.70
DHE4	0	2.6	-	-	-	-	-	-	2.6	34.65	34.65
DHE5	0	1.6	1.6	35.5	35.5	44.08	-	-	-	-	44.08

Drillhole locations for previous drilling programmes are also shown on Plan No. G143 and results have been incorporated in the cross-sections on Plan No. G144a and No. G144b.

Drilling results are in general accord with those obtained in previous drilling programmes.

Core samples were submitted for alumina determination. Intervals sampled are shown on geological logs in Appendix A and chemical analyses quoted on a dried basis are presented in Appendix B.

Origin of white clay-shale

The white clay-shales are residual kaolinitic rocks developed in the cycle of deep weathering which took place in the Tertiary period now believed to be of late Eocene to Oligocene age.

Hiern (1974) suggests that metasomatic processes possibly of lower Palaeozoic age have been active as well as the Tertiary weathering cycle. This suggestion is based on the presence of thin veins of kaolinitic material which cut across bedding in the clay-shale. In addition, Hiern (*op. cit.*) suggests that due to proximity of the pits to the Adelaidean-Cambrian unconformity, kaolinisation may be related to this feature.

Drilling results demonstrate that white clay-shale has uneven but definite lower limit and is underlain by relatively less altered rocks. This indicates alteration resulted entirely from the deep weathering event.

The association of highest quality white kaolinite with the structural high rimming the saucer shaped depression suggests that the degree of alteration is not only controlled by original lithological composition but also tectonic features forming structural traps which influenced circulation of groundwater.

Thin discordant kaolinite veinlets developed similarly in joints and tension cracks which also behaved as structural traps.

PRODUCT QUALITY

Fireclay

White and pale coloured non-plastic clay with low silt content is utilised as aluminous fireclay. A total of 281 unpublished quality control chemical analysis quoted on a calcined basis are summarised in Table D and have been used to construct the compositional field diagram shown on plan No. S27.

Table D : Birdwood clay and silica quarry - Summary of Chemical Data.

Calcined Basis	Range (per cent)		Average (Per cent)
	from	to	
SiO_2	49.9	74.80	58.00
Al_2O_3	18.00	46.20	37.00
Fe_2O_3	0.10	7.40	1.50
TiO_2	0.10	3.00	1.50
CaO	0.05	0.55	0.15

Results of refractoriness determinations are summarised in Table E.

Table E : Birdwood Clay and Silica Quarry - Summary of Refractoriness Determinations.

Character	No. of Determinations	Range		Average
		from	to	
Softening Point ^{o}C	210	1410	1770	1710
Fusion Point ^{o}C	198	1425	1780	1730

The fireclay fires white to off-white colour.

Impurities include limonite nodules which produce iron spotting on firing affecting the appearance of bricks and should be avoided for high quality products.

Abnormally high vanadium content may produce a green staining on fired ware.

White Clay

White clay below fireclay alumina specification is utilised by the South Australian Portland Cement Co. Ltd. as a whitening additive in the manufacture of white cement.

This material is also suitable for manufacture of cream coloured house bricks.

Kaolin

Two grades of silt free kaolin are selectively quarried according to colour. Top grade white colour (K_2) has a slight yellowish hue and second grade (K_1) is pale yellow-brown. The kaolin is milled by Jarvis Industries P/L for sale as industrial filler.

Minerallogically the material comprises mainly kaolinite with minor quartz, mica, tourmaline and pyrite.

Trial tests by R. Fowler Limited suggest the material is unsuitable for light ceramic purposes due to fine grain size.

Paper manufacturers state the material falls below paper grade colour specification due to slight yellowish hue.

Improved whiteness would achieve a wider market acceptance for the milled product. Investigation is recommended into methods of treatment to upgrade colour.

Calcined kaolin from Birdwood is being evaluated as an alternative to imported calcined clays.

Silica

Iron stained quartzite in the near surface zone is suitable only for road rubble and filling sand. Underlying clean quartzite is excavated for silica.

Refractory silica is used in manufacture of refractory bricks and ladle cement and other refractory applications.

Chemical analysis of a representative stockpile sample is presented in Table F.

Table F : Birdwood Clay and Silica Quarry - chemical analysis of silica sample.

	per cent
SiO_2	98.45
Fe_2O_3	0.29
Al_2O_3	0.44
TiO_2	0.10
CaO	0.05
MgO	0.10
Na_2O	0.03
K_2O	0.34
LOI	0.20
Total	100.00

Washed silica would be suitable for use in ceramic whiteware and glass manufacture. The feasibility of producing a range of glass, foundry and abrasive silica sand from the deposit should be investigated. In addition, evaluation as an industrial milled product is warranted.

ENVIRONMENTAL CONSIDERATIONS

Barrier mound construction and tree planting programmes are included in the quarry development plan to ensure future operations do not obtrude on the local landscape.

A larger settling pond and planned drainage facilities are required to minimise water pollution as well as allowing orderly quarry development.

Abandoned mine shafts are fenced.

Rubbish dumping should be formally prohibited.

QUARRY DEVELOPMENT PLAN

A plan for quarry development (plan No. G145) has been constructed based on geological, topographic and drilling data and incorporates environmental considerations.

The five stage plan enlarges the present quarry design, takes account of drainage, access and stockpile requirements and restricts visibility of the workings from the surrounding public roads.

Clay pit faces are 10 metres high and slope 50^{o} and berms range from 3 metres to 10 metres wide as required. Quartzite pit faces are up to 16 metres high and slope 60^{o} and berms range from 3 metres to 7 metres as required.

Barrier mounds should be constructed using waste material covered by soil and clay overburden material and then vegetated.

Installation of pumping facilities is required to maintain drainage of the quarry.

An improved settling pond is required to prevent water pollution.

On completion of extraction, a hole 450 metres long by 410 metres wide and up to 50 metres deep remains. Possible after uses for the excavation include either an ornamental lake or a sporting arena.

RESERVES

Reserve calculations are based on the quarry outlines shown on the quarry development plan No. G145, geological limits shown on the geological plan No. G143 and cross-sections on plan No. G144a and No. G144b and using an SG of 2.0 for both quartzite and clay.

Drilling results alone are unreliable for subdivision of the white clay-shale into fireclay, white clay and kaolin. Therefore, for the purpose of reserve calculations the white clay-shale is estimated to contain 30 per cent fireclay, 60 per cent white clay and 10 per cent kaolin.

Quantities of usable raw material as well as overburden and waste materials are detailed in Table G.

These indicated reserves figures show that production of silica should exceed production of clay to enable orderly quarry development. Thus additional outlets for silica are required.

Table G : Birdwood clay and silica quarry - Indicated Reserves

Stage No. (see plan No. G145)	Over-burden	Waste	Silica and Quartzite	Fireclay	White Clay	Kaolin	Total
1 (present stockpile)	500	50,000	6,000	2,500	-	200	59,200
2	5,000	15,000	40,000	40,000	80,000	13,000	193,000
3	10,000	40,000	200,000	105,000	210,000	35,000	600,000
4	25,000	100,000	1,000,000	600,000	1,200,000	200,000	3,125,000
5	75,000	300,000	3,000,000	420,000	840,000	140,000	4,775,000
Total	115,500	505,000	4,246,000	1,167,500	2,330,000	388,200	8,752,200

SUMMARY AND CONCLUSIONS

Birdwood clay and silica quarry is excavated in altered argillite and quartzite of the Saddleworth Formation (Burra Group) of Adelaidean age.

Alteration of argillite to kaolinitic white clay-shale by deep weathering processes took place during the Tertiary period. The degree of alteration is controlled by original lithological composition and tectonic features which influenced groundwater circulation.

Quarry products are aluminous fireclay for refractory bricks, white clay for white cement, two grades of kaolin for industrial filler, silica for refractory products and rubble for road construction.

From 1971 to 30 June 1975 recorded production totals 35,555 tonnes of white clay-shale and 30,635 tonnes of decomposed quartzite.

A core drilling programme of 22 holes totalling 908.08 metres combined with geological mapping provide a basis for defining quarry limits. Within a proposed quarry development plan based on extension of the present quarry design, indicated reserves of 3.89 million tonnes of white clay-shale and 4.25 million tonnes of decomposed quartzite are available.

Quarry development requires barrier mound construction and tree planting programme, an enlarged settling pond and installation of pumping facilities.

Investigations are required into treatment methods to improve kaolin whiteness and into expansion of silica outlets.

Douglas Nichol

Douglas Nichol
Geologist

20 October, 1975

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APPENDIX A

Explanatory Notes and Logs of Drillholes

APPENDIX A

EXPLANATORY NOTES AND LOGS OF DRILLHOLES

DRILLING PROCEDURES

Equipment

A truck-mounted Pioneer type 160 drilling machine was used.

All core was drilled size NMLC, nominal diameter 5 centimetres. "M" type stationary inner tube core barrels were used fitted with bottom discharge bits and split inner tubes.

Storing and marking of core

Cores were stored in galvanised iron trays. The boxes were marked with consecutive compartment numbers. Drilled depths from the surface, in metres, were marked on wooden blocks which were placed in the compartments. The core was boxed in this manner at the drill site being placed in its appropriate place in the box as soon as it was extracted from the core barrel.

Cores were later split, sampled, logged, reboxed in wooden trays and stored at the Department of Mines, Drilling and Mechanical Branch, Dalgleish Street Thebarton, South Australia, where they are available for inspection.

Notes on Diamond Drill log sheets

The logs have been plotted on a vertical scale of one centimetre = one metre (1:100).

The descriptions given on the log sheet refer only to materials recovered as core. Core may be lost by being ground or washed away during the drilling process; it may usually be inferred that such material was relatively weak but this cannot always be assumed since even solid rock can be ground away and lost under some conditions.

To the left of the graphic log is a geological description of the materials sampled. This includes:-

Geological age)
Rock Unit name) printed vertically

Nature and type of material.

B.W. sample numbers (e.g. BW88/75) shown on the column headed "Structures" on the logs refers to alumina assays presented in Appendix B.

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE NO. DHA1
SERIAL NO. —

PROJECT S.A. Clay Deposits — PLAN REFERENCE G143
FEATURE Birdwood Clay Quarry — COORDINATES —
LOCATION Section 6397, Hundred of Talunga — ANGLE FROM HORIZ. 90° — DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	No core recovered						
		Clay, white, slightly silty. Altered schist.		1				1
		No core recovered		2				2
		Clay, white, slightly silty. Altered schist.		3				3
				4				4
		No core recovered.		5				5
		Clay, white, slightly silty. Altered schist.		6				6
				7				7
		No core recovered.		8				8
				9				9
		Clay, white, slightly silty. Altered schist.		10				10
		Clay, white and yellow-brown, silty. Altered schist		11				11
		No core recovered						
		Clay, white, slightly silty. Altered schist.		12				12
				13				13
				14				14
		No core recovered.		15				15
		Clay, white, slightly silty. Altered schist.		16	foliation at 30° to core axis			16
				17				17
		No core recovered.		18				18
		Clay, white, slightly silty. Altered schist.		19				19
				20				20

REMARKS END OF HOLE 20.3 METRES

RAW MATERIALS DIVISION

DRILL No 544.415 ... LOGGED .....
TYPE Pioneer 160 ..... D. NICHOL ...
DRILLER W.T. Trestrail ... DRAWN DN ...
START 18-8-75 ... TRACED DN ...
FINISH 19-8-75 ... CHECKED .....
SHEET 1 OF 1 ... DRG No. — .....

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DH2
SERIAL No. —

PROJECT S.A. Clay Deposits — PLAN REFERENCE G143
FEATURE Birdwood Clay Quarry — COORDINATES —
LOCATION Section 4397, Hundred of Talunga — ANGLE FROM HORIZ 90° DIRECTION —

AGE UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m
ADELAIDEAN SADDLEWORTH FORMATION	No core recovered						
	Clay, white. Altered schist	S	1	banding at 45° to core axis			1
	No core recovered		2				2
	Clay, white, kaolinite. Altered schist	S	3				3
			4				4
	No core recovered		5				5
	Clay, white, kaolinite. Altered schist	S	6				6
			7				7
	No core recovered		8				8
	Clay, white. Altered schist	S	9	banding at 45° to core axis			9
			10				10
	No core recovered		11				11
	Clay, white, slightly silty. Altered schist	S	12				12
			13				13
	No core recovered		14				14
	Clay, white, slightly silty. Altered schist	S	15				15
			16				16
	END OF HOLE 16.8 METRES		17				17

REMARKS

RAW MATERIALS DIVISION

DRILL No. S44.415 LOGGED
TYPE Pioneer 160 D. NICHOL
DRILLER W.T. Trethail DRAWN D.N.
START 19-8-75 TRACED D.N.
FINISH 20-8-75 CHECKED
SHEET 1 OF 1 DRG No. —

NEWBOLD GENERAL REFRACTORIES Ltd.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHB 2

~~SERIAL No.~~

PROJECT S.A. Clay Deposits. PLAN REFERENCE G143

FEATURE Birdwood Clay Deposits. COORDINATES —

LOCATION Section 4397, Hundred of Talunga ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CASING	DEPTH m.
		Clay, white. Altered schist.					
		Clay, white. Altered schist.		1			1
		No core recovered		2			2
				3			3
				4			4
				5			5
				6			6
				7			7
				8			8
				9			9
				10			10
				11			11
				12			12
				13			13
				14			14
ADELAIDEAN / SADDLEWORTH Formation		Sandstone, pale brown and red-brown.		15			15
		No core recovered		16			16
				17			17
		Sand and Clay, off-white and pink.		18			18
		No core recovered		19			19
				20			20

REMARKS

RAW MATERIALS DIVISION

DRILL No. SUL 415 LOGGED.

TYPE Pioneer 160 J.H. Callender

DRILLER W.J. Trestail DRAWN. D.N.

START 23-2-74 TRACED.

FINISH 1-3-74 CHECKED.

SHEET 1 OF 3 DRG No. 1

NEWBOLD GENERAL REFRACTORIES, LTD. HOLE No. DHB 2

LOG OF DIAMOND DRILL HOLE

PROJECT S.A. Clay Deposits. PLAN REFERENCE G143

FEATURE Birdwood Clay Deposit COORDINATES —

LOCATION Section 6397, hundred of Talunga ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING
ADELAIDEAN	SADDLEWORTH FORMATION	No core recovered					
		Clay, off-white. Altered schist.		21			
				22			
		No core recovered		23			
		Clay. off-white, silty. Altered schist.		24			
				25			
				26			
		Clay. off-white, silty. Altered Schist.		27			
		No core recovered.		28			
				29			
		Clay, off-white, silty. Altered schist.		30			
				31			
				32			
		Clay, grey and pale brown, silty. Altered schist		33			
		Schist, grey, pyritous.					
		No core.		34			
		Schist, grey.		35			
				36			
		Schist, pale grey, siliceous, pyritous		37	Foliation at 90° to core axis		
				38			
				39			
				40			

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SUM 415 LOGGED.

TYPE Pioneer 160 J.H Callender

DRILLER W.T. Trestail DRAWN D.N.

START 23-2-74 TRACED.

FINISH 1-3-74 CHECKED.

SHEET 2 OF 3 - DRG No. 2

NEWBOLD GENERAL REFRACTORIES LTD. HOLE No. DHB 2

LOG OF DIAMOND DRILL HOLE

SERIAL No

PROJECT S.A. Clay Deposits. PLAN REFERENCE G143

FEATURE Birdwood Clay Deposit COORDINATES —

LOCATION Section 6397, hundred of Talunga ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES
ADELAIDEAN	SADDLEWORTH FORMATION	Schist, pale grey, siliceous, pyritous	S S	41	
				42	
				43	
				44	
				45	
				46	
				47	
				48	
				49	
				50	
				51	
				52	
				53	
				54	
				55	
				56	
				57	
		End of Hole 57.34 metres		58	

REMARKS:

RAW MATERIALS DIVISION

DRILL No. SUL 415 LOGGED.....

TYPE Pioneer 160 S. H. Callender

DRILLER W.T. Trestail DRAWN D. N.

START 23-2-74 TRACED

FINISH 1-3-74 CHECKED

SHEET 3 OF 3 DRG. No 3

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE NO. DHB 3

~~SERIAL NO~~

PROJECT S.A. Clay Deposits — PLAN REFERENCE G143

FEATURE Birdwood Clay Deposits — COORDINATES —

LOCATION Section 6297, hundred of Talunga — ANGLE FROM HORIZ. 90° — DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	No core recovered.		1, 2				1, 2
		Conglomerate, brown.		3				3
		Sandstone, pale brown, friable		4, 5, 6, 7, 8				4, 5, 6, 7, 8
		Sandstone, white, friable		9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20				9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

REMARKS.

RAW MATERIALS DIVISION

DRILL NO. SUH 415 — LOGGED

TYPE Pioneer 160 — J.H. Callender

DRILLER W.T. Trestail — DRAWN D.N.

START 2-3-74 — TRACED

FINISH 14-3-74 — CHECKED

SHEET 1 OF 3 — DRG NO. 4

NEWBOLD GENERAL REFRACTORIES LTD

LOG OF DIAMOND DRILL HOLE

HOLE No. DHB3
SERIAL No.

PROJECT S.A. Clay Deposits. PLAN REFERENCE G143
FEATURE Birdwood Clay Deposits. COORDINATES —
LOCATION Section 6397, hundred of Talunga ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	Sandstone, white, friable.		21, 22				21, 22
		No core recovered.		23		■		23
		Clay, off-white, slightly silty, Altered schist.	s s s	24, 25				24, 25
		No core recovered.		26		■		26
		Clay, off-white, slightly silty, Altered schist.	s s s	27				27
		No core recovered.		28		■		28
		Clay, off-white, slightly silty. Altered schist.	s s s					
		Clay, off-White, Altered Schist.	s s s	29				29
		Schist, grey, pyritous	s s s	30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40				30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

REMARKS.

RAW MATERIALS DIVISION

DRILL No. 544 415 LOGGED
TYPE Pioneer 160 G. H. Callender
DRILLER W.T. Trestail DRAWN D.N.
START 2-3-74 TRACED
FINISH 14-3-74 CHECKED
SHEET 2 OF 3 DRG No. 5

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE NO. DHB 3.
SERIAL NO. ....

PROJECT S.A. Clay Deposits .... PLAN REFERENCE G143
FEATURE Birdwood Clay Deposits .... COORDINATES —
LOCATION Section 6397, hundred of Talunga ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m
ADELAIDEAN	SADDLEWORTH FORMATION	Schist, grey, pyritous	S S S S S ...	41, 42, 43, 44, 45, 46, 47, 48, 49				41, 42, 43, 44, 45, 46, 47, 48, 49
		End of Hole 49.22 metres		50				50

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SUU 415 — LOGGED J.H. Callender
TYPE Pioneer 160
DRILLER W.T. Trestail — DRAWN D.N.
START 2-3-74 — TRACED ....
FINISH 14-3-74 — CHECKED ....
SHEET 3 OF 3 — DRG No. 6

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE NO. D H G 4
SERIAL NO. .....

PROJECT S.A Clay Deposits ..... PLAN REFERENCE G143 .....
FEATURE Birdwood Clay Pit ..... COORDINATES —
LOCATION Section 6397, hundred of Talunga ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CORE RECOVERY
RECENT		Clay, brown. Soil units and materials within the soil profile.		1			
ADELAIDEAN	SADDLEWORTH FORMATION	Clay, red, sandy. Altered schist.		2			
				3			
		Sandstone, off-white and pale brown.		4			
				5			
				6			
				7			
				8			
				9			
				10			
				11			
		Clay. white, silty. Altered schist		12			
		Sandstone, grey, course. grained.		13			
				14			
				15			
				16			
		Clay. off-white silty. Altered schist					
		No Core recovered		17			
				18			
		Clay. off-white, silty. Altered schist.		19			
				20			

REMARKS.

RAW MATERIALS DIVISION

DRILL N° SUM 415 LOGGED .....
TYPE Pioneer 160 J. H Callender
DRILLER W.T. Trestail DRAWN D. N.
START 14-3-74 TRACED .....
FINISH 21-3-74 CHECKED .....
SHEET 1 OF 3 DRG N° 7

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No DHB4

PROJECT S.A. Clay Deposits — PLAN REFERENCE G143

FEATURE Birdwood Clay Pit — COORDINATES —

LOCATION Section 6397, hundred of Talunga — ANGLE FROM HORIZ 90° — DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	SS	J	m
		Clay — off-white, silty. Altered Schist.	S S S S S S S S	21				21
		No core recovered.		22				22
		Clay — pale brown, silty. Altered Schist	S S S S S S S S	23				23
				24				24
		Schist — grey, pyritous	S S S S S S S S	25				25
				26				26
				27				27
				28				28
				29				29
				30				30
				31				31
		Clay. — grey-brown, Altered schist.	S S S S S S S S	32				32
				33				33
				34				34
				35				35
		Clay, white. Altered schist	S S S	36	BW 88/75			36
		No core recovered.		37				37
				38				38
		Clay. off-white silty. Altered Schist.	S S S	39				39
		No core recovered						
		Clay. pale grey silty. Altered schist	S S S	40	BW 89/75			40

ADELAIDEAN — SADDLEWORTH FORMATION

REMARKS.

RAW MATERIALS DIVISION

DRILL No SULL 415 — LOGGED. J. H Callender

TYPE Pioneer 160

DRILLER W.T. Trestail — DRAWN D.N.

START 14-3-74 — TRACED

FINISH 21-3-74 — CHECKED

SHEET 2 OF 3 — DRG No. 8

NEWBOLD GENERAL REFRACTORIES LTD.

HOLE NO. DHB4

~~SERIAL NO~~

LOG OF DIAMOND DRILL HOLE

PROJECT S.A. Clay Deposits.

FEATURE Birdwood Clay Pit,

LOCATION Section 6397, hundred of Talunga.

PLAN REFERENCE G143

COORDINATES —

ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	R.L. m
ADELAIDEAN	SADDLEWORTH FORMATION	Clay pale grey. silty. Altered schist	S-S S-S S-S	41	BW 89/75			41
		Clay pale grey. Altered schist.	S-S S-S S-S	42	BW 90/75			42
		Clay off-white, silty. Altered schist	S-S		BW 91/75			
		No core recovered.		43				43
				44				44
				45				45
		Clay off-white, slightly silty Altered schist	S-S S-S S-S	46	BW 92/75			46
		No core recovered.		47				47
		Clay off-white, minor yellow staining	S-S	48	BW 93/75			48
		End of Hole 48.00 METRES						

REMARKS.

RAW MATERIALS DIVISION

DRILL NO SUL 415 LOGGED.

TYPE Pioneer 160 J. H. Callender

DRILLER W.T. Trestail DRAWN D.N

START 14-3-74 TRACED

FINISH 21-3-74 CHECKED

SHEET 3 OF 3 DRG NO. 9

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. D.H.B.5

SERIAL No. .....

PROJECT S.A. Clay Deposits ..... PLAN REFERENCE ....G143.....

FEATURE Birdwood Clay Pit ..... COORDINATES .....

LOCATION Section 6397, hundred of Talunga ANGLE FROM HORIZ. 90° DIRECTION .....

AGE / UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m
ADELAIDEAN / SADDLEWORTH FORMATION	No core recovered.		1				1
	Quartzite, grey, sandy.		2				2
	Sandstone, grey and pale orange-brown, friable, course- to fine-grained.		3 4 5 6 7 8 9 10 11 12 13 14 15 16 17				3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
	No core recovered.		18				18
	Quartzite, off-white sandy		19 20	Foliation at 80° to core axis			19 20

REMARKS.

RAW MATERIALS DIVISION

DRILL No S.M.H. 415 LOGGED .....

TYPE Pioneer 160 .... D. Nichol ...

DRILLER W.T. Trestail DRAWN ... D.N.

START 22-3-74. TRACED .....

FINISH 29-3-74. CHECKED .....

SHEET 1 OF 3 DRG No. 10 ....

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHBS

SERIAL No. .....

PROJECT S.A. Clay Deposit ..... PLAN REFERENCE ..... G143 .....

FEATURE Birdwood Clay Pit. ..... COORDINATES ..... — .....

LOCATION Section 6397, hundred of Talunga ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	Quartzite, off-white, sandy		21				21
		No core recovered		22		■		22
		Clay, off-white, silty. Altered schist.	S S S					
		No core recovered		23		■		23
				24				24
				25				25
		Clay, white, Altered schist.	S S S		BW 49/75			
		No core recovered.		26		■		26
				27				27
		Schist, yellow-brown, sandy, decomposed.	S S					
		No core recovered		28		■		28
		Clay, off-white and pale brown, silty Altered schist.	S S S S S S		Foliation at 80° to core axis			
		No core recovered.		29		■		29
				30				30
		Clay, white, Altered schist.	S S S	31	BW 50/75			31
		No core recovered.		32		■		32
		Clay, white, Altered schist.	S S S	33	BW 51/75			33
		Clay, white, Altered schist.	S S S	34	BW 52/75			34
		Clay, white, Altered schist.	S S S	35	BW 53/75			35
		Clay, off-white and grey, Altered schist.	S S	36	BW 54/75			36
		No core recovered		37		■	■	37
		Clay, off-white, silty. Altered schist	S S S	38	BW 55/75			38
		Clay, off-white, sandy, Altered schist, No core recovered	S S	39		■		39
		Clay, white, Altered schist	S S S	40	BW 56/75			40

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SHU. 415 ..... LOGGED .....

TYPE Pioneer 160 ..... D. Nichol .....

DRILLER N.T. Trestrail ..... DRAWN D.N.

START 22-3-74 ..... TRACED .....

FINISH 29-3-74 ..... CHECKED .....

SHEET 2 OF 3 ..... DRG No. 11 .....

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHB5
SERIAL No.

PROJECT S.A. Clay Deposits — PLAN REFERENCE G143
FEATURE Birdwood Clay Pit. — COORDINATES —
LOCATION Section 6397, hundred of Talunga, ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEV m
ADELAIDEAN	SADDLEWORTH FORMATION	Clay. off-white, yellow and red. Altered schist.	S S S S S		foliation at 75° to core axis			
		No core recovered		41		■		
				42		■		
				43		■		
		Clay, off-white, silty. Altered schist	S S S					
		Clay, white. Altered schist.	S S S	44	B W 57/75			
		No core recovered.				■		
		Clay, white, silty. Altered schist.	S S S S S S	45	B. W. 58/75			
		No core recovered		46		■		
		Clay, white, silty. Altered schist.	S S S S S S	47	B. W. 59/75			
				48				
		End of Hole 47·29 metres						

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SHW. 415 — LOGGED.....
TYPE Pioneer 160 — D. Nichol
DRILLER W.J. Trestail — DRAWN. D.N.
START 22-3-74 — TRACED.....
FINISH 29-3-74 — CHECKED.....
SHEET 3 OF 3 — DRG No. 12

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE NO. DHB 6

~~SERIAL NO.~~

PROJECT S.A. Clay Deposits. PLAN REFERENCE G143

FEATURE Birdwood Clay Pit. COORDINATES —

LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING
RECENT	1	Clay, brown. Soil units and materials within the soil profile		1			
ADELAIDEAN	SADDLEWORTH FORMATION	Schist, grey, decomposed.		2			
				3			
		No core recovered		4		■	
		Schist, grey, decomposed.		5	foliation at 30° to core axis		
				6			
		No core recovered		7		■	
		Schist, grey, decomposed.		8	foliation at 20° to core axis.		
				9			
		No core recovered.		10		■	
				11			
		Schist, grey decomposed.		12			
		No core recovered.		13		■	
				14			
		Schist, grey decomposed.			foliation at 20° to core axis		
		No core recovered		15		■	
				16			
		Quartzite, grey, hard.		17			
				18			
				19			
		No core recovered				■	
		Quartzite, grey, hard.		20			

REMARKS. End of Hole 19.90 metres

RAW MATERIALS DIVISION

DRILL NO. SUU. 415. LOGGED.

TYPE Pioneer 160 D. Nichol

DRILLER W.T. Trestail DRAWN D.N

START 29-4-74 TRACED

FINISH 31-4-74 CHECKED

SHEET 1 OF 1 DRG NO. 13

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHC 1
~~SERIAL No.~~

PROJECT S.A. Clay Deposits
FEATURE Birdwood Clay Pit
LOCATION Section 6397, hundred of Talunga.

PLAN REFERENCE G143
COORDINATES —
ANGLE FROM HORIZ. 90°   DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES
RECENT	1	Clay Brown, Soil units and materials within the soil profile.	o-o	1	
ADELAIDEAN	SADDLEWORTH FORMATION	Schist, grey, decomposed	S S S	2	
		Clay, off-white, silty. Altered schist.	S-S	3	B.W 74/75 Foliation at 20° to core axis
		Clay, off-white, silty. Altered schist.	S-S	4	BW 75/75
		Clay, off-white, silty. Altered schist.	S-S	5, 6	BW 76/75 Foliation at 20° to core axis
		Clay off-white, silty. Altered schist.	S-S	7	BW 77/75
		No core recovered.			
		Clay, off-white, silty. Altered schist.	S-S	8, 9, 10	BW 78/75
		No core recovered.			
		Clay, off-white and pale yellow, silty. Altered schist.	S-S	11, 12, 13	BW 79/75
		No core recovered.			
		Clay, off-white, silty. Altered schist.	S-S	14, 15, 16	BW 80/75
		Clay, off-white, silty. Altered schist	S-S	17, 18	BW 81/75
		No core recovered.		19, 20	

REMARKS.

RAW MATERIALS DIVISION

DRILL No. 544. 415.   LOGGED. D. Nichol
TYPE Pioneer 160
DRILLER W.T. Trestail   DRAWN. D.N
START 14-7-74.   TRACED
FINISH 11-8-74.   CHECKED
SHEET 1 OF 3   DRG No. 14

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHC 1

~~SERIAL No.~~

PROJECT S.A. Clay Deposits. PLAN REFERENCE G143

FEATURE Birdwood Clay Pit. COORDINATES —

LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	Clay, off-white, silty. Altered schist.		21	BW 82/75			21
		Clay, off-white, silty. Altered schist.			BW 83/75			
		No core recovered.		22		■		22
		Clay, off-white, silty. Altered schist.		23				23
		No core recovered.				■		
		Clay, off-white, silty. Altered schist.		24				24
		No core recovered.		25		■		25
				26				26
		Clay, off-white, silty. Altered schist.		27	BW 84/75			27
		No core recovered.		28		■		28
				29				29
		Clay, off-white, silty. Altered schist.		30	BW 85/75			30
				31				31
		No core recovered.		32		■		32
		Clay, off-white, silty. Altered schist.		33	BW 86/75			33
				34				34
				35				35
		No core recovered.				■		
		Clay, off-white, silty. Altered schist.		36	BW 87/75			36
				37				37
				38				38
		Schist, grey, decomposed.		39	Foliation at 30° to core axis.			39
		No core recovered.		40		■		40

REMARKS.

RAW MATERIALS DIVISION

DRILL No. S44.415. LOGGED.....

TYPE Pioneer 160 D. Nichol

DRILLER W.T. Trestail DRAWN D.N.

START 14:7:74 TRACED.....

FINISH 11-8-74 CHECKED.....

SHEET 2 OF 3 DRG No. 15

NEWBOLD GENERAL REFRACTORIES LTD.

HOLE No. DHC 1

LOG OF DIAMOND DRILL HOLE

PROJECT S.A. Clay Deposits. PLAN REFERENCE G143

FEATURE Birdwood Clay Pit. COORDINATES —

LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	SAMPLES	
		No core recovered.		41			4
				42			4
		End of Hole, 41.65 metres					

REMARKS:

RAW MATERIALS DIVISION

DRILL No. SUM 415 LOGGED

TYPE Pioneer 160 D Nichol

DRILLER W.T Trestail DRAWN D.N.

START 14-7-74 TRACED

FINISH 11-8-74 CHECKED

SHEET 3 OF 3 DRG No. 16

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHC 2

~~SERIAL No~~

PROJECT S.A Clay Deposits. PLAN REFERENCE G143

FEATURE Birdwood Clay Pit. COORDINATES —

LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m	STRUCTURES	CORE LOSS	CASING	DEPTH m
ADELAIDEAN	SADDLEWORTH FORMATION	Quartzite, grey.						
		No core recovered.		1				1
		Quartzite, grey.		2				2
		No core recovered.		3				3
		Quartzite, grey		4				4
		No core recovered.		5				5
		Sandstone, grey-brown, medium- to fine-grained.		6				6
				7				7
				8				8
				9				9
		Quartzite, grey		10	BW 60/75			10
		Clay, off-white. Altered schist						
		No core recovered						
		Clay, off-white. Altered schist		11	BW 61/75			11
		Clay, off-white. Altered schist		12	BW 62/75			12
		No core recovered.						
		Clay, off-white. Altered schist		13	BW 63/75			13
		Clay, off-white. Altered schist.		14	BW 64/75			14
		Clay, off-white. Altered schist.		15	BW 65/75			15
		Clay, off-white. Altered schist		16	BW 66/75			16
				17				17
		Clay, off-white. Altered schist.			BW 67/75			
		Clay, off-white. Altered schist.		18	BW 68/75.			18
				19				19
		No core recovered.		20				20

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SUM 415. LOGGED.....

TYPE Pioneer 160 D. Nichol

DRILLER W.T. Trestail DRAWN. D.N

START. 6-7-74 TRACED.

FINISH 12-7-74 CHECKED.....

SHEET 1 OF 2. DRG No. 17

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. D.HC2
~~SERIAL No.~~

PROJECT S.A Clay Deposits.
FEATURE Birdwood Clay Pit.
LOCATION Section 6397, hundred of Talunga

PLAN REFERENCE G143
COORDINATES —
ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	No core recovered						
		Clay. off-white and yellow. Altered Schist		21	BW 69/75			21
		No core recovered.		22				22
				23				23
		Clay. off-white, slightly silty. Altered Schist.			BW 70/75			
		Clay. grey, silty - Altered schist.		24	BW 71/75			24
				25				25
				26				26
				27				27
				28				28
		Clay. grey, silty. Altered schist.		29	BW 72/75			29
				30				30
				31				31
				32				32
		No core recovered.						
		Clay. pale grey, silty. Altered schist.		33	BW 73/75			33
				34				34
				35				35
		End of Hole 35.57 metres		36				36
				37				37
				38				38
				39				39
				40				40

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SHH.415 LOGGED.
TYPE Pioneer 160 D. Nichol
DRILLER W.T. Trestail DRAWN D.N.
START 6-7-74 TRACED.
FINISH 12-7-74 CHECKED.
SHEET 2 OF 2 DRG No. 18

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHC 3

~~SERIAL No.~~ .....

PROJECT S.A. Clay Deposits ..... PLAN REFERENCE ... G143 .....

FEATURE Birdwood Clay Pit ..... COORDINATES ... — .....

LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ. 90° DIRECTION — .....

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	Sandstone, yellow-brown and red brown.		1				1
				2				2
		No core recovered.		3		■		3
				4		■		4
		Sand, orange-brown, medium-to fine-grained.		5				5
				6				6
				7				7
				8				8
				9				9
				10				10
				11				11
				12				12
				13				13
				14				14
				15				15
				16				16
				17				17
				18				18
				19				19
		Sand, grey and pale brown.		20				20

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SUM 415 ... LOGGED .....

TYPE Pioneer 160 ..... D. Nichol .....

DRILLER W.T. Trestail . DRAWN. D.N. ...

START ..29-3-74... TRACED .....

FINISH ..2-4-74.. CHECKED .....

SHEET ..1.. OF ..3.. DRG No. 19 ....

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHC 3

~~SERIAL No.~~

PROJECT S.A. Clay Deposits. PLAN REFERENCE G143

FEATURE Birdwood Clay Pit COORDINATES —

LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	Sand, grey and pale brown, coarse-to fine-grained.		21				2
				22				2
				23				2
				24				2
				25				2
				26				2
				27				2
				28				2
		No core recovered		29				2
		Clay, white. Altered schist.			BW 42/75			
		Clay, off-white. Altered schist.		30	BW 43/75			3
		Clay, pale red-brown, sandy. Altered schist.		31				3
		Mixed Clay, sandstone and schist, red brown.		32				3
		Ferricrete.						
		Clay, off-white, silty. Altered schist.		33	BW 44/75			3
				34				3
		Clay, grey, silty. Altered schist.		35	BW 45/75			3
				36				3
				37				3
		No core recovered,		38				3
		Clay, grey, silty. Altered schist.						
		No core recovered.		39				3
				40				4

REMARKS.

RAW MATERIALS DIVISION

DRILL No. 544.415 LOGGED.

TYPE Pioneer. 160 D. Nichol

DRILLER W.T. Trestail DRAWN D.N.

START 29.3.74 TRACED

FINISH 2.4.74 CHECKED

SHEET 2 OF 3 DRG No. 20

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHC 3
~~SERIAL No~~

PROJECT S.A. Clay Deposits.
FEATURE Birdwood Clay Pit.
LOCATION Section 6397, hundred of Talunga.

PLAN REFERENCE G143
COORDINATES —
ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES
ADELAIDEAN	SADDLEWORTH FORMATION	No core recovered.		41	
		Clay, grey, silty. Altered schist.	S-S	42, 43, 44, 45	BW 46/75
		No core recovered.		46	
		Clay, grey, silty. Altered schist.	S-S	47, 48, 49	BW 47/75
		No core recovered.		50	
		End of Hole 50.35 metres		51	

REMARKS:

RAW MATERIALS DIVISION

DRILL No. 544.415 LOGGED D.Nichol
TYPE Pioneer 160
DRILLER W.T. Trestail. DRAWN DN.
START 29-3-74 TRACED
FINISH 2-4-74 CHECKED
SHEET 3 OF 3 DRG No. 21

NEWBOLD GENERAL REFRACTORIES LTD

LOG OF DIAMOND DRILL HOLE

HOLE No. DHC 4

PROJECT S.A. Clay Deposits. PLAN REFERENCE 6143

FEATURE Birdwood Clay Pit. COORDINATES —

LOCATION Section 6397. hundred of Talunga. ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING
RECENT		Sandy Clay, pale brown. Soil units and materials within the soil profile.		1			
		No core recovered.		2			
				3			
	I	Sandy Clay, pale brown, regolith material					
ADELAIDEAN	SADDLEWORTH FORMATION	No core recovered.		4			
				5			
				6			
		Quartzite, pale yellow, sandy.		7			
		No core recovered.		8			
		Quartzite, off-white.					
		No core recovered.		9			
				10			
				11			
		Quartzite, off-white, sandy.					
		No core recovered.		12			
				13			
				14			
		Quartzite, grey					
		No core recovered.		15			
		Sandstone, off-white, soft.		16			
		No core recovered.		17			
		Quartzite, pink.					
		No core recovered.		18			
		Quartzite, pink.		19			
		No core recovered.		20			

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SUM 415 LOGGED.

TYPE Pioneer 160. D. Nichol

DRILLER W.T. Trestail DRAWN D.N.

START 27-4-74 TRACED.

FINISH 3-5-74 CHECKED

SHEET 1 OF 3. DRG No. 22

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE NO. DHC 4
~~SERIAL NO~~

PROJECT S.A. Clay Deposits.
FEATURE Birdwood Clay Pit.
LOCATION Section 6397, hundred of Talunga.

PLAN REFERENCE G143
COORDINATES —
ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	Quartzite, pink.						
		No core recovered.		21				21
		Quartzite, pink.						
		No core recovered.		22				22
				23				23
		Quartzite, pink.		24				24
		No core recovered.		25				25
		Quartzite, pink.		26				26
		No core recovered.		27				27
				28				28
				29				29
		Quartzite, pink.						
		Sandstone, grey, soft.		30				30
				31				31
				32				32
		Quartzite, pink		33				33
		No core recovered.						
		Schist, pale brown, decomposed.		34	foliation at 70° to core axis			34
		No core recovered.		35				35
		Clay, pale red brown, silty. Altered schist.		36				36
				37				37
		Ferricrete – breccia		38				38
				39				39
		Clay, pale red-brown, silty. Altered schist.		40				40

REMARKS:

RAW MATERIALS DIVISION

DRILL N° SUU 415 LOGGED.
TYPE Pioneer 160 D. Nichol
DRILLER W.T. Trestail DRAWN D.N.
START 27-4-74 TRACED
FINISH 3-6-74 CHECKED
SHEET 2 OF 3 DPG N°. 23

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHC 4

~~SERIAL No~~

PROJECT S.A. Clay Deposits

FEATURE Birdwood Clay Pit.

LOCATION Section 6397, hundred of Talunga.

PLAN REFERENCE G143

COORDINATES —

ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	Clay, pale red-brown, silty. Altered schist.		41				41
		Clay, pale grey, silty. Altered schist.		42				42
				43				43
		Clay, grey, silty, pyritous. Altered schist.		44				44
		No core recovered.		45				45
		Clay, pale grey, silty. Altered schist.		46				46
		Clay, pale grey. Altered schist.		47	BW 32/75			47
		End of Hole 47·19 metres		48				48

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SUM 415 LOGGED

TYPE Pioneer 160 D. Nichol

DRILLER W.T. Trestail DRAWN D. N.

START 27-4-74 TRACED

FINISH 3:5:74 CHECKED

SHEET 3 OF 3 DRG No. 24

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHC 5
~~SERIAL No~~ .....

PROJECT S.A Clay Deposits ..... PLAN REFERENCE ... G143 .....
FEATURE Birdwood Clay Pit ..... COORDINATES ... — .....
LOCATION Section 6397, hundred of Talunga ANGLE FROM HORIZ 90° ... DIRECTION ... — ....

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m
ADELAIDEAN	SADDLEWORTH FORMATION	Sand, pale grey, slightly clayey		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20				1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

REMARKS.

RAW MATERIALS DIVISION

DRILL No S.U.U. 415 ... LOGGED .....
TYPE Pioneer 160 ... D. Nichol .....
DRILLER W.T. Trestail ... DRAWN ... D.N. ...
START 4-5-74 ... TRACED .....
FINISH 8-5-74 ... CHECKED .....
SHEET 1 OF 3 ... DRG No. 25 ....

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHC.5
SERIAL No. .....

PROJECT S.A. Clay Deposits ..... PLAN REFERENCE ..... G143 .....
FEATURE Birdwood Clay Pit ..... COORDINATES ..... — .....
LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ. 90° DIRECTION ... — ....

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m
ADELAIDEAN	SADDLEWORTH FORMATION	Sand, pale grey, slightly clayey		21				21
				22				22
				23				23
				24				24
		Quartzite, off-white and grey, friable bands and glassy bands.		25				25
				26				26
				27	foliation at 30° to core axis			27
				28				28
				29				29
				30				30
				31				31
				32				32
				33				33
				34				34
				35				35
				36				36
		No core recovered.		37		■		37
		Quartzite, off-white and grey		38				38
				39				39
				40				40

REMARKS.

RAW MATERIALS DIVISION

DRILL No. 544.415 ... LOGGED .....
TYPE Pioneer 180 ..... D. Nichol .....
DRILLER W.T. Trestail ... DRAWN .. D.N. ...
START .4-5-74 .... TRACED .....
FINISH .8-5-74 .... CHECKED .....
SHEET .. 2 OF 3 .. DRG No. .26 .....

NEWBOLD GENERAL REFRACTORIES LTD. HOLE NO. DHC 5
SERIAL NO.

LOG OF DIAMOND DRILL HOLE

PROJECT S.A Clay Deposits ..... PLAN REFERENCE ... 6143
FEATURE Birdwood Clay Pit. ..... COORDINATES ... —
LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING
A	sf	Quartzite, off-white and grey					
				41			
		End of Hole. 40·15 metres					

REMARKS.

RAW MATERIALS DIVISION

DRILL NO. SUM 415 ... LOGGED. ...
TYPE. Pioneer 160 ... D. Nichol ...
DRILLER. W.T. Trestail ... DRAWN. DN.
START. 4-5-74 ... TRACED. ...
FINISH. 8-5-74 ... CHECKED ...
SHEET. 3 OF 3. DRG. NO. 27

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHC 6
SERIAL No. .....

PROJECT S.A. Clay Deposits ..... PLAN REFERENCE ... G143 .....
FEATURE Birdwood Clay Pit. ..... COORDINATES ... — .....
LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ ... 90° ... DIRECTION ... — .....

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m
ADELAIDEAN	SADDLEWORTH FORMATION	No core recovered.		1		■		1
		Schist, grey and grey-brown, decomposed	S S S S S S S S S S S S S S S S	2	foliation at 10° to core axis			2
				3				3
				4				4
		No core recovered.				■		
		Schist, pale brown, decomposed.	S S S S S S S S S S S S S S S S	5				5
				6				6
		No core recovered.		7		■		7
		Schist, grey decomposed.	S S S S S S S S S S S S S S S S	8	foliation at 15° to core axis			8
				9				9
		No core recovered.		10		■		10
		Schist, grey and black, decomposed.	S S S S S S S S S S S S S S S S	11	foliation at 10° to core axis			11
				12				12
				13				13
		No core recovered.				■		
		Schist, grey-black, decomposed.	S S S S S S S S S S S S S S S S	14	foliation at 20° to core axis			14
				15				15
		No core recovered.		16		■		16
		Schist, black decomposed.	S S S S S S S S	17				17
		No core recovered.		18		■		18
				19				19
				20				20

REMARKS.

RAW MATERIALS DIVISION

DRILL No. 544.415 ... LOGGED .....
TYPE Pioneer 160 ..... D. Nichol .....
DRILLER W.T. Trestail DRAWN D.N.
START ... 17-8-74 ... TRACED .....
FINISH ... 19-8-74 ... CHECKED .....
SHEET 1 OF 2 DRG No. 28 .....

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHC 6.
SERIAL No.

PROJECT S.A. Clay Deposits
FEATURE Birdwood Clay Pit.
LOCATION Section 6397, hundred of Talunga.

PLAN REFERENCE G143
COORDINATES —
ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES
ADELAIDEAN	SADDLEWORTH FORMATION	No core recovered			
		Schist, grey and brown, decomposed.		21	
		No core recovered.		22, 23	
		Quartzite, grey, minor bands of schist.			foliation at 20° to core axis
		No core recovered.		24, 25	
		Quartzite, grey, minor bands of clay		26	
		Schist, pale grey decomposed.		27, 28	foliation at 20° to core axis
		No core recovered		29	
		Schist, grey, decomposed with bands of white clay		30, 31	
		No core recovered		32	
		End of hole 32.20 metres		33	

REMARKS

RAW MATERIALS DIVISION

DRILL No. SUU 415
TYPE Pioneer 160
DRILLER W.T. Trestail
START 17-8-74
FINISH 19-8-74

LOGGED D. Nichol
DRAWN D.N.
TRACED
CHECKED

SHEET 2 OF 2 DRG No. 29

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHD 2

~~SERIAL No.~~

PROJECT S.A. Clay Deposits — PLAN REFERENCE

FEATURE Birdwood Clay Pit. — COORDINATES

LOCATION Section 6397, hundred of Talunga — ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING
RECENT	—	Clay, brown. Soil units and materials within the soil profile.		1			
ADELAIDEAN	SADDLEWORTH FORMATION	No core recovered.					
		Clay, off-white, silty. Altered schist.		2	B.W. 33/75		
				3			
		No core recovered		4			
		Clay, off-white, silty. Altered schist.		5	B W 34/75		
				6			
		No core recovered.		7			
		Clay, off-white, silty. Altered schist.		8			
				9	B W 35/75		
				10			
		No core recovered		11			
		Clay, off-white, silty. Altered schist.		12	B W 36/75		
		No core recovered.		13			
		Schist, grey and brown, decomposed.		14			
		Clay, off-white, silty. Altered schist.		15			
				16	B.W 37/75		
				17			
				18			
				19			
				20			

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SHH 415 ... LOGGED.....

TYPE Pioneer 160 ... D. Nichol

DRILLER W. Trestail ... DRAWN. D.N.

START 21-6-74 ... TRACED.....

FINISH 25-6-74 ... CHECKED.....

SHEET 1 OF 3, DRG No. 30

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE NO. DHD 2

~~SERIAL NO~~

PROJECT S.A. Clay Deposits — PLAN REFERENCE G143

FEATURE Birdwood Clay Pit — COORDINATES —

LOCATION Section 6397, hundred of Talunga. — ANGLE FROM HORIZ 90° — DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
		Clay, off-white, silty. Altered schist.			B.W 37/75			
		Clay, off-white, silty. Altered schist.		21				21
				22				22
		No core recovered.						
		Clay, off-white, silty. Altered schist.		23	B.W 39/75			23
		No core recovered.		24				24
		Clay, off-white, silty. Altered schist.		25	B.W. 40/75			25
				26				26
				27				27
		No core recovered.		28				28
		Clay, off-white, silty. Altered schist.		29	B.W 41/75			29
		No core recovered:		30				30
				31				31
		Clay, off-white, silty. Altered schist.		32	B.W 42/75			32
		No core recovered.		33				33
				34				34
		Clay, pale red brown, silty. Altered schist		35				35
		Schist pale red brown, decomposed.		36				36
		No core recovered.		37				37
		Schist, yellow and red brown, decomposed.		38				38
		No core recovered.		39				39
				40				40

ADELAIDEAN — SADDLEWORTH FORMATION

REMARKS.

RAW MATERIALS DIVISION

DRILL No. S.U.U. 415. — LOGGED.....

TYPE Pioneer 160 — D. Nichol

DRILLER W.T. Trestail — DRAWN D.N.

START 21-6-74 — TRACED.....

FINISH 25-6-74 — CHECKED.....

SHEET 2 OF 3. DRG. No. 31

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. D.H.D 2

~~SERIAL No.~~

PROJECT S.A. Clay Deposits
FEATURE Birdwood Clay Pit
LOCATION Section 6397, hundred of Talunga

PLAN REFERENCE G143
COORDINATES —
ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE RECOVERY	CORE LOSS
ADELAIDEAN	SADDLEWORTH FORMATION	No core recovered.					
		Schist, yellow and red brown, decomposed.	S S S S S S	41			
		No core recovered.		42			
				43			
		End of Hole 43.70 metres		44			

REMARKS

RAW MATERIALS DIVISION

DRILL No. SUM 415 LOGGED.....
TYPE Pioneer 180 D. Nichol
DRILLER N.T. Trestail DRAWN D.N.
START 21-6-74 TRACED.....
FINISH 25-6-74 CHECKED.....

SHEET 3 OF 3, DRG No. 32

NEWBOLE GENERAL REFRACTORIES LTD. HOLE No DHD 3
~~SURFACE No~~

LOG OF DIAMOND DRILL HOLE

PROJECT S.A. Clay Deposits. PLAN REFERENCE G143.
FEATURE Birdwood Clay Pit. COORDINATES —
LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	SAMPLE	m.
RECENT	—	Clay, brown, Within soil profile		1				1
				2				2
ADELAIDEAN SADDLEWORTH FORMATION		Clay, off-white, slightly silty. Altered schist.		3				3
				4				4
		No core recovered.				■		
		Clay, off-white, slightly silty. Altered schist.		5	BW 48/75			5
		Clay, white, slightly silty. Altered schist.		6	BW 14/75			6
		Clay, off-white, slightly silty. Altered schist		7	BW 15/75			7
		Clay, off-white, silty. Altered schist.		8	BW 16/75			8
				9				9
		Clay, off-white, slightly silty. Altered schist.		10	BW 17/75			10
				11				11
				12				12
		Clay, off-white, slightly silty. Altered schist.		13	BW 18/75			13
		Clay, off-white, slightly silty. Altered schist.		14	BW 19/75			14
				15				15
		No core recovered.		16		■		16
		Clay, off-white. Altered schist.		17	BW 20/75			17
		Clay, off-white. Altered schist		18	BW 21/75			18
		Clay, off-white. Altered schist		19	BW 22/75			19
		Clay, off-white, Altered schist		20	BW 23/75			20

REMARKS.

RAW MATERIALS DIVISION

DRILL No "SUM 415" LOGGED.
TYPE Pioneer 160 D Nichol
DRILLER W.T. Trestail DRAWN D.N.
START 3-4-74 TRACED
FINISH 8-4-75 CHECKED
SHEET 1 OF 3 DRG No 33

NEWBOLD GENERAL REFRACTORIES LTD

LOG OF DIAMOND DRILL HOLE

HOLE No DHD 3.

PROJECT S.A. Clay Deposits
FEATURE Birdwood Clay Pit.
LOCATION Section 6397, hundred of Talunga.

PLAN REFERENCE G.143
COORDINATES —
ANGLE FROM HORIZ 90° DIRECTION —

AGE UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	
ADELAIDEAN SADDLEWORTH FORMATION	Clay, off-white. Altered schist.			BW 23/75	
	Clay, pale grey. Altered schist.		21	BW 24/75	21
	Sandy Clay, yellow-brown. Altered schist.				
	Clay, pale grey. Altered schist.		22	BW 25/75	22
	No core recovered.		23		23
			24		24
			25		25
	Clay, off-white and red brown. Altered schist.				
	Clay, pale grey. Altered schist.		26		26
	No core recovered.				
	Clay, white. Altered schist.		27	BW 26/75	27
	Clay, white. Altered schist.		28	BW 27/75	28
	No core recovered.		29		29
	Clay, off-white, slightly silty. Altered schist.		30	BW 28/75	30
	Clay, off-white, slightly silty. Altered schist.		31	BW 29/75	31
			32		32
	No core recovered.		33		33
			34		34
	Clay, grey, silty. Altered schist.				
	Clay, white, slightly silty. Altered schist.		35	BW 30/75	35
	Clay, white, slightly silty. Altered schist.		36	BW 31/75	36
	Clay, off-white and pale brown, minor staining, silty. Altered schist.		37		37
	Schist, pale brown, decomposed.		38		38
	No core recovered.		39		39
			40		40

REMARKS

RAW MATERIALS DIVISION

DRILL No SHH 415 LOGGED
TYPE Pioneer 160 D. Nichol
DRILLER W.T Trestail DRAWN D.N.
START 3-4-74 TRACED
FINISH 8-4-74 CHECKED

SHEET 2 OF 3 DRG No. 34

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHD 3

SERIAL No. .....

PROJECT S.A. Clay Deposits — PLAN REFERENCE G143

FEATURE Birdwood Clay Pit. — COORDINATES —

LOCATION Section 6397, hundred of Talunga — ANGLE FROM HORIZ 90° — DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	SAMPLE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	No core recovered.						
		Schist, yellow-brown and red-brown, decomposed.	S S S S S S S S S	41	foliation at 45° to core axis			41
		No core recovered.		42				42
		Schist, grey, decomposed.	S S S					
		No core recovered.		43				43
		Schist, pale red-brown and grey, decomposed.	S S S S S S S	44				44
		End of Hole 44.90 metres		45				45

REMARKS

RAW MATERIALS DIVISION

DRILL No. SHW 415 — LOGGED .....

TYPE Pioneer 160 — D. Nichol

DRILLER W.T. Trestail — DRAWN D.N.

START 3-4-74 — TRACED .....

FINISH 8-4-74 — CHECKED .....

SHEET 3 OF 3 — DPG No. 35

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE NO. DHD.4

PROJECT S.A. Clay Deposits — PLAN REFERENCE G143

FEATURE Birdwood Clay Pit. — COORDINATES —

LOCATION Section 6897, hundred of Talunga. — ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES
RECENT		Clay pale brown, plastic within soil profile.		1	
ADELAIDEAN	SADDLEWORTH FORMATION	Clay, white, silty. Altered schist.		2	
		No core recovered.			
		Clay, white and red-brown, silty. Altered schist.		3	
		No core recovered.			
		Clay, white and red-brown, silty. Altered schist.		4	
		No core recovered			
		Ferricrete, brown, hard.		5	
		No core recovered.			
		Clay, white and red-brown, silty. Altered schist		6	
				7	
		Clay, off-white and red-brown, silty. Altered schist.		8	
		No core recovered.		9	
		Clay, pale red-brown, silty. Altered schist.		10	
		Clay, red-brown, silty.		11	
		Clay: off-white and pale red-brown, silty Altered schist.		12	
		Clay, off-white, silty. Altered schist.		13	B.W 11/75
				14	
		Clay: pale brown, silty. Altered schist.		15	foliation at 45° to core axis
		No core recovered.		16	
		Clay, off-white and pale brown, silty. Altered schist.			
		Clay, brown silty. Altered schist.		17	
		No core recovered.			
		Clay, brown, silty. Altered schist.		18	foliation at 5° to core axis.
		Clay: pale brown and off-white, silty. Altered schist.		19	
				20	

REMARKS:

RAW MATERIALS DIVISION

DRILL No Sull 415 — LOGGED

TYPE Pioneer 160 — D. Nichol

DRILLER W.T. Trestail — DRAWN D. N.

START 26-6-74 — TRACED

FINISH 1-7-74 — CHECKED

SHEET 1 OF 3 DWG No 36

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHD 4

~~SERIAL No~~ .....

PROJECT S.A. Clay Deposits. PLAN REFERENCE G 143

FEATURE Birdwood Clay Pit. COORDINATES —

LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ. 90° DIRECTION —

AGE UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN SADDLEWORTH FORMATION	Clay, pale brown and off-white, silty. Altered schist						
	Clay, pale brown and brown, silty. Altered schist		21	foliation at 45° to core axis.			21
			22				22
	No core recovered.		23				23
	Schist, grey-brown, decomposed.		24				24
	No core recovered.		25				25
			26				26
	Schist, grey decomposed.		27				27
	Clay, off-white, silty.		28	B.W 12/75			28
	No core recovered.		29				29
	Clay, off-white, silty, claystone bands. Altered schist.						
	Schist, grey, decomposed.		30				30
	No core recovered.		31				31
	Schist, grey, decomposed.		32	foliation at 75° to core axis			32
			33				33
	Schist, pale grey, decomposed.						
	No core recovered.		34				34
	Clay off-white, silty. Altered schist.		35				35
	Quartzite pale grey, hard.						
	Clay, off-white, silty. Altered schist.		36	B.W 12/75			36
	No core recovered		37				37
	Sandstone, white, clayey		38				38
	Clay, pale grey, sandy. Altered schist.		39				39
	Clay, pale grey, silty. Altered schist.		40				40

REMARKS.

RAW MATERIALS DIVISION

DRILL No. 344 415 LOGGED .....

TYPE Pioneer 160 D. Nichol

DRILLER W.T. Trestail DRAWN D.N.

START 26-6-74 TRACED .....

FINISH 1-7-74 CHECKED .....

SHEET 2 OF 3 DRG No. 37

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHD 4.
SERIAL No

PROJECT S. A. Clay Deposits.
FEATURE Birdwood Clay Pit.
LOCATION Section 6397, hundred of Talunga.

PLAN REFERENCE G 143
COORDINATES —
ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES
ADELAIDEAN	SADDLEWORTH FORMATION	Clay, pale grey, silty. Altered schist.	s s s s s s		
		No core recovered.		41	
		Clay, pale grey, silty and sandy. Decomposed schist	s s s	42	
		Clay, pale yellow brown, silty. Decomposed schist	s s s s s s s s s	43	
		No core recovered.		44	
				45	

End of hole 44.70 metres.

REMARKS

RAW MATERIALS DIVISION

DRILL No 344 415	LOGGED
TYPE Pioneer 160	D. Nichol
DRILLER W.T Trestail	DRAWN D.N.
START 26-6-74	TRACED
FINISH 1-7-74	CHECKED
SHEET 3 OF 3	DRG No. 38

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHD 5.
~~SERIAL No.~~ .....

PROJECT S.A. Clay Deposits ..... PLAN REFERENCE ... G143 .....
FEATURE Birdwood Clay Pit ..... COORDINATES ..... — .....
LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ .. 90° DIRECTION ... — ....

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
RECENT	—	Clay, brown. Soil units and materials within the soil profile.		1				1
ADELAIDEAN	SADDLEWORTH FORMATION	Schist, brown, decomposed.		2	foliation at 30° to core axis			2
		Schist, grey, yellow and red brown, decomposed		3				3
				4				4
				5				5
		Clay, off-white, silty. Minor iron staining.		6				6
				7	BW 10175.			7
				8				8
				9				9
		No core recovered.		10		■		10
		Quartzite, off-white, hard.						
		Sandstone, grey, soft.		11				11
				12				12
				13				13
				14				14
				15				15
		Quartzite, off-white, hard.		16	foliation at 45° to core axis			16
				17				17
				18				18
				19				19
				20				20

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SUM. 415 ... LOGGED .....
TYPE Pioneer 160 ..... D. Nichol .....
DRILLER N.T. Trestail. DRAWN. D.N. ..
START 12.8.74 .... TRACED .....
FINISH 16-8-74 ... CHECKED .....
SHEET 1 OF 3. DRG No. 39 .....

NEWBOLD GENERAL REFRACTORIES LTD.

HOLE NO. DHD 5

SERIAL NO.

LOG OF DIAMOND DRILL HOLE

PROJECT S.A. Clay Deposits — PLAN REFERENCE G 143

FEATURE Birdwood Clay Pit — COORDINATES —

LOCATION Section 6397, hundred of Talunga. — ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	SAMPLING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	Quartzite, off-white, hard.		21				21
				22				22
				23				23
				24				24
				25				25
				26				26
				27				27
				28				28
				29				29
				30				30
		Clay, off-white, sandy, red stained. Decomposed schist.		31				31
		No core recovered.		32				32
		Ferricrete						
		No core recovered.		33				33
				34				34
				35				35
		Schist, grey, off-white and pale brown, decomposed.		36				36
		No core recovered.		37				37
				38				38
		Schist, grey.		39				39
		No core recovered.		40				40

REMARKS.

RAW MATERIALS DIVISION

DRILL N° SUM 415 — LOGGED

TYPE Pioneer 160 — D. Nichol

DRILLER W.T. Trestail — DRAWN D.N.

START 12-8-74 — TRACED

FINISH 16-8-74 — CHECKED

SHEET 2 OF 3 — DPG N° 40

NEWBOLD GENERAL REFRACTORIES LTD

HOLE No. DHD 5

LOG OF DIAMOND DRILL HOLE

PROJECT S. A. Clay Deposits
FEATURE Birdwood Clay Pit.
LOCATION Section 6397, hundred of Talunga.

PLAN REFERENCE G143
COORDINATES —
ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES
Adelaidean	Saddleworth Formation	No core recovered.		41	
		End of hole 41.19 metres		42	

REMARKS

RAW MATERIALS DIVISION

DRILL No. SUL 415
TYPE Pioneer 160
DRILLER W.T. Trestail
START 12-8-74
FINISH 16-8-74
LOGGED D. Nichol
DRAWN D.N.
TRACED
CHECKED
SHEET 3 OF 3. DRG No. 41

NEWBOLD GENERAL REFRACTORIES LTD. HOLE No DHE1

LOG OF DIAMOND DRILL HOLE

PROJECT S.A Clay Deposits. PLAN REFERENCE G 143

FEATURE Birdwood Clay Pit. COORDINATES —

LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES
RECENT	—	Clay, pale brown, plastic. Within soil profile.		1	
				2	
ADELAIDEAN	SADDLEWORTH FORMATION	Clay, red-brown and yellow-brown, silty. Altered schist.		3	
				4	foliation at 45° to core axis
				5	
				6	
		No core recovered.			
		Clay, red-brown and yellow-brown, silty Altered schist.		7	
				8	
				9	
				10	
		No core recovered		11	
		Clay off-white, silty, Minor iron staining Altered schist.			
		Clay, off-white, silty. Altered schist		12	BW 7/75
		Clay, off-white. Altered schist		13	BW 8/75
		No core recovered.			
		Clay, off-white, silty. Altered schist.		14	BW 9/75
				15	
		Clay, grey, silty. Altered schist.			foliation at 45° to core axis.
		No core recovered.		16	
				17	
		Clay, grey, silty. Altered schist.			foliation at 70° to core axis
				18	
		No core recovered.		19	
				20	

REMARKS.

RAW MATERIALS DIVISION

DRILL No SUR. 415 LOGGED.

TYPE Pioneer 160 D Nichol

DRILLER W.T. Trestail DRAWN D. N.

START 18-5-74 TRACED

FINISH 21-5-74 CHECKED

SHEET 1 OF 3 DRG No. 42

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. D.H.E.1

~~SERIAL No.~~ .....

PROJECT S.A. Clay Deposits ..... PLAN REFERENCE ....G143 .....

FEATURE Birdwood Clay Pit ..... COORDINATES ..... — .....

LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ. 90° DIRECTION ... — ....

AGE: ADELAIDEAN

UNIT: SADDLEWORTH FORMATION

DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
Clay, grey, silty. Altered schist.	S S S S S S S S S S S S S S S S	21	foliation at 70° to core axis,			21
No core recovered.		22		■		22
Clay, grey, silty. Altered schist.	S S S S S S S S S S S S S S S S	23				23
		24				24
No core recovered.		25		■		25
Clay, grey and pale red-brown, silty. Altered schist.	S S S S S S S S S S S S S S S S	26				26
		27	foliation at 70° to core axis.			27
No core recovered.		28		■		28
Clay, grey and pale red-brown, silty. Altered schist.	S S S S S S S S S S S S S S S S	29	foliation at 50° to core axis			29
		30				30
No core recovered.		31		■		31
Clay, grey and pale red-brown, silty Altered schist.	S S S S S S S S S S S S S S S S	32				32
		33				33
		34				34
		35				35
No core recovered.		36		■		36
Clay, grey and pale red-brown, silty. Altered schist.	S S S S S S S S S S S S S S S S	37				37
		38	foliation at 45° to core axis			38
		39				39
		40				40

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SUM 415 ... LOGGED .....

TYPE Pioneer 160 .... D. Nichol ...

DRILLER N.T. Trestrail DRAWN .. D.N. ..

START 18-6-74 ... TRACED .....

FINISH 21-5-74 .. CHECKED .....

SHEET ... 2 OF 3 ... DRG No. ... 43 ...

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHE 1

~~SERIAL No.~~

PROJECT S. A. Clay Deposits. PLAN REFERENCE G143

FEATURE Birdwood Clay Pit. COORDINATES —

LOCATION Section 6397, hundred of Talunga ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	Clay, grey and pale red-brown, silty. Altered schist.	S S S S S S S S S S	41				41
		No core recovered.						
		Clay, grey and pale red-brown, silty. Altered schist.	S S S S S S S S S S	42	foliation at 50° to core axis			42
				43				43
		No core recovered.						
		Clay, grey and pale red-brown, silty. Altered schist.	S S S S S S S S S S	44	foliation at 40° to core axis			44
				45				45
		No core recovered.		46				46
				47				47
		Clay, grey and pale red-brown, silty Altered schist.	S S S S S S S S S S	48				48
				49				49
		No core recovered.		50				50
		End of hole 50.70 metres						

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SAM 415 LOGGED.

TYPE Pioneer 160 D. Nichal

DRILLER W.T. Trestail DRAWN D.N.

START 18-5-74 TRACED

FINISH 21-5-74 CHECKED

SHEET 3 OF 3 DRG No. 44

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE NO. DHE 2

~~SERIAL NO.~~

PROJECT S.A. Clay Deposits — PLAN REFERENCE G143

FEATURE Birdwood Clay Pit. — COORDINATES —

LOCATION Section 6397, hundred of Talunga. — ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	SAMPLE	DEPTH m.
RECENT		Clay, red-brown, plastic. Within soil profile.		1				1
		Clay, pale brown. Altered schist.		2				2
ADELAIDEAN	SADDLEWORTH FORMATION	No core recovered.		3				3
		Clay, off-white and yellow-brown. Altered schist.		4	foliation at 60° to core axis.			4
				5				5
				6				6
				7				7
		No core recovered		8				8
		Clay, off-white and yellow brown. Altered schist.		9				9
		No core recovered.		10				10
		Clay, red-brown. Altered schist.		11				11
				12				12
				13				13
		Clay, red-brown and yellow brown. Altered schist.		14	foliation at 60° to core axis			14
				15				15
		No core recovered.		16				16
				17				17
		Clay, red-brown and yellow brown Altered schist.		18	foliation at 80° to core axis			18
				19				19
		No core recovered.		20				20

REMARKS.

RAW MATERIALS DIVISION

DRILL N° SUM 415 — LOGGED

TYPE Pioneer 160 — D. Nichol

DRILLER W.T. Trestail — DRAWN D.N.

START 26-5-74 — TRACED

FINISH 29-5-74 — CHECKED

SHEET 1 OF 3 — DRG N° 45

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHE 2
~~SERIAL No.~~ ....

PROJECT S.A. Clay Deposits .... PLAN REFERENCE ... G 143 ....
FEATURE Birdwood Clay Pit .... COORDINATES ... — ....
LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ. 90° .. DIRECTION .. — ....

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	Clay, red-brown and yellow-brown. Altered schist.	S S S	21, 22, 23, 24, 25, 26, 27	foliation at 70° to core axis (at 23)			21, 22, 23, 24, 25, 26, 27
		No core recovered.		28, 29		■		28, 29
		Clay, red-brown. Altered schist.	S S S	30, 31	foliation at 45° to core axis (at 30)			30, 31
		No core recovered.		32		■		32
		Clay, red-brown and yellow-brown. Altered schist.	S S S	33, 34				33, 34
		No core recovered.		35		■		35
		Clay, red-brown. Altered schist.	S S S	36				36
		No core recovered.		37, 38		■		37, 38
		Clay, pale brown. Altered schist.	S S S	39	foliation at 45° to core axis.			39
		No core recovered.		40		■		40

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SML 415 ... LOGGED ......
TYPE Pioneer 160 ... D. Nichol ......
DRILLER W.T. Trestail .. DRAWN .. D.N. ..
START .. 26-5-74 ... TRACED ......
FINISH .. 29-5-74 ... CHECKED ......
SHEET .. 2 OF 3 ... DRG No. .. 46 ...

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No DHE 2
SERIAL No

PROJECT S.A. Clay Deposits.
FEATURE Birdwood Clay Pit.
LOCATION Section 6397, hundred of Talunga

PLAN REFERENCE G143
COORDINATES —
ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES
ADELAIDEAN	SADDLEWORTH FORMATION	No core recovered.		41	
		Clay, red-brown. Altered schist.	s s s	42	
		No core recovered.		43	
		Clay, grey-brown. Altered schist.	s s s	44, 45	
		No core recovered.		46, 47, 48, 49	
		End of hole 49·50 metres		50	

REMARKS

RAW MATERIALS DIVISION

DRILL No SUU 415	LOGGED
TYPE Pioneer 160	D. Nichol
DRILLER W.T. Trestail	DRAWN D.N.
START 26-5-74	TRACED LAT
FINISH 29-5-74	CHECKED
SHEET 3 OF 3	DRG No. 47

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHE 3

~~SERIAL No.~~

PROJECT S.A. Clay Deposits ..... PLAN REFERENCE ... G143 .....

FEATURE Birdwood Clay Pit ..... COORDINATES ... — .....

LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ. 90° DIRECTION ... — .....

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
Rec Ext		Clay, red-brown, plastic. Within soil profile.						
		Clay, off-white, iron stained. Altered schist.		1				1
		No core recovered.						
		Clay, off-white, slightly iron stained. Altered schist.		2	already sampled.			2
				3				3
				4				4
				5				5
				6				6
				7				7
				8				8
				9				9
		Clay, off-white, slightly iron stained. Kaolinite. Altered schist.		10				10
		No core recovered.		11				11
		Clay, off-white, kaolinite. Altered schist.		12	BW 6/75			12
ADELAIDEAN	SADDLEWORTH FORMATION	Clay, grey with red iron-staining. Altered schist.		13	foliation at 45° to core axis.			13
				14				14
				15				15
		Clay, grey, slightly iron stained, silty. Altered schist.		16				16
				17				17
				18	foliation at 30° to core axis.			18
				19				19
				20				20

REMARKS.

RAW MATERIALS DIVISION

DRILL No. 544.415 ... LOGGED .....

TYPE Pioneer 160 .... D. Nichol .....

DRILLER N.T. Trestail . DRAWN .. D.N. ...

START 23-5-74 .... TRACED .. AT ...

FINISH 25-5-74 .... CHECKED .....

SHEET 1 OF 3 .. DRG No. 48 .....

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHE. 3

~~SERIAL No.~~

PROJECT S.A. Clay Deposits. PLAN REFERENCE G143

FEATURE. Birdwood Clay Pit. COORDINATES. —

LOCATION. Section 6397, hundred of Talunga. ANGLE FROM HORIZ. 90° DIRECTION. —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	Clay, grey and red iron stained, silty. Altered schist.	S S S S S S S S S S S S	21	foliation at 20° to core axis.			21
		No core recovered.		22				22
				23				23
		Clay, pale brown, heavily iron stained. Altered schist.	S S S S S S S S S S S S	24	foliation at 45° to core axis.			24
		No core recovered.		25				25
		Clay, yellow brown. Altered schist. Minor quartzite bands.	S S S S S S S S S S S S	26				26
		No core recovered.		27				27
		Clay, off-white, iron stained. Altered schist.	S S S S S S S S S S S S	28				28
				29				29
		Clay, pale red-brown, iron stained. Altered schist.	S S S S S S S S S S S S	30	foliation at 45° to core axis			30
		No core recovered.		31				31
				32				32
		Clay, grey and brown, iron stained. Altered schist. Minor kaolin veins.	S S S S S S S S S S S S	33	foliation at 10° to core axis.			33
				34				34
		No core recovered.		35				35
		Clay, red-brown, iron stained. Altered schist.	S S S S		foliation at 45° to core axis			
		No core recovered.		36				36
				37				37
				38				38
		Clay, grey and red-brown, iron stained. Altered schist.	S S S S S S	39				39
		No core recovered		40				40

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SUM 415 LOGGED.....

TYPE Pioneer 160 D. Nichol

DRILLER W.T. Trestail DRAWN. D.N.

START 23-5-74 TRACED. AT

FINISH 25-5-74 CHECKED.....

SHEET 2 OF 3 DRG No. 49

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. DHE 3
SERIAL No. ....

PROJECT S.A. Clay Deposits. PLAN REFERENCE G143
FEATURE. Birdwood Clay Pit COORDINATES. —
LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ. 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
		No core recovered						
		Clay, grey and red-brown, iron stained. Altered schist.		41	foliation at 20° to core axis			41
				42				42
	ADELAIDEAN SADDLEWORTH FORMATION	No core recovered.		43				43
		Clay, grey and pale brown. Altered schist.		44				44
				45				45
		No core recovered.		46				46
		Clay, grey and pale brown. Altered schist.		47				47
				48				48
				49				49
		End of Hole 48.70 metres.						

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SHM 415 LOGGED.....
TYPE Pioneer 160 D. Nichol.....
DRILLER W.T. Trestail DRAWN D. N.
START 23-5-74 TRACED M.T.
FINISH 25-5-74 CHECKED.....
SHEET 3 OF 3 DRG No. 50

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE NO. DHE 4

~~SERIAL NO~~

PROJECT S.A. Clay Deposits

FEATURE Birdwood Clay Pit.

LOCATION Section 6397, hundred of Talunga.

PLAN REFERENCE G143

COORDINATES 2 metres below and 20m. E of proper site

ANGLE FROM HORIZ. 90° DIRECTION. -

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
RECENT		Clay and sandy clay, pale brown. Soil units and materials within the soil profile.		1				1
				2				2
ADELAIDEAN	SADDLEWORTH FORMATION	Clay. off-white and pale brown, silty, Altered schist.	S S S	3	foliation at 45° to core axis			3
				4				4
		Clay. pale brown. Altered schist.	S s s		foliation at 10° to core axis			
		No core recovered.		5				5
		Clay. pale brown, Altered schist.	S S S	6				6
		Quartzite. pale brown. clayey.		7				7
		No core recovered		8				8
		Quartzite. pale brown, clayey.						
		Clay. pale brown. Altered schist.	S S S S	9				9
		No core recovered.						
		Clay. pale brown. Altered schist.	S S S S	10				10
		No core recovered.		11				11
		Clay. off-white. Altered schist.	S S S S	12				12
		Schist. yellow-brown, limonitic, micaceous and silty. Highly altered.	S S S S	13				13
				14				14
				15				15
				16	foliation at 20° to core axis.			16
				17				17
				18				18
				19				19
				20				20

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SUU 415 LOGGED.....

TYPE Pioneer 160 D. Nichol

DRILLER W.T. Trestail DRAWN D.N.

START 15-6-74 TRACED LAT

FINISH 19-6-74 CHECKED.....

SHEET 1 OF 2 DRG No. 51

NEWBOLD GENERAL REFRACTORIES LTD. HOLE NO. DHE 4

LOG OF DIAMOND DRILL HOLE

~~SERIAL NO~~

PROJECT S.A. Clay Deposits. PLAN REFERENCE G143

FEATURE Birdwood Clay Pit. COORDINATES —

LOCATION Section 6397. hundred of Talunga. ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	Schist, yellow-brown, limonitic, micaceous and silty. Highly altered.	S S S	21				21
				22				22
				23				23
				24				24
				25				25
				26				26
				27				27
				28				28
				29				29
		No core recovered.		30				30
				31				31
				32				32
				33				33
				34				34
				35				35
		End of hole 34.65 metres						

REMARKS.

RAW MATERIALS DIVISION

DRILL No. SHW 415 LOGGED.

TYPE Pioneer 160 D. Nichol

DRILLER W.T. Trestail DRAWN D.N.

START 15-6-74 TRACED AT

FINISH 19-6-74 CHECKED

SHEET 2 OF 2 DRG No. 52

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE NO. DHE5
~~SERIAL NO.~~

PROJECT S.A. Clay Deposits. PLAN REFERENCE G143.
FEATURE Birdwood Clay Pit. COORDINATES —
LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
RECENT		Clay, grey, and red-brown and yellow-brown and within the soil profile.	G	1				1
ADELAIDEAN	SADDLEWORTH FORMATION	Clay, grey, silty. Decomposed schist. Minor concordant veinlets of Kaolin.	S	2	foliation at 45° to core axis.			2
				3				3
				4				4
				5				5
				6				6
				7				7
				8				8
		No core recovered.		9				9
		Clay, grey, silty. Decomposed schist. Minor iron staining.	S	10				10
				11				11
		No core recovered.		12				12
				13				13
		Clay, grey, silty Decomposed schist Iron stains	S		foliation at 60° to core axis			
		No core recovered.		14				14
		Clay, red, silty Decomposed schist Iron stains	S		foliation at 45° to core axis			
		No core recovered.		15				15
		Clay, grey, silty. Decomposed schist. Minor Kaolin veins.	S	16	foliation at 50° to core axis			16
		No core recovered.		17				17
		Clay, grey, silty. Decomposed schist.	S	18	foliation at 70° to core axis			18
		No core recovered.		19				19
				20				20

REMARKS.

RAW MATERIALS DIVISION

DRILL N° 544 415 ... LOGGED .....
TYPE Pioneer 160 ... D. Nichol
DRILLER W.T. Trestail DRAWN D.N.
START 10-6-74 ... TRACED 44
FINISH 14-6-74 ... CHECKED .....
SHEET 1 OF 3. DRG N° 53

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE NO DHE 5
SERIAL NO.

PROJECT S.A. Clay Deposits. PLAN REFERENCE G143
FEATURE Birdwood Clay Pit. COORDINATES —
LOCATION Section 6397, hundred of Talunga. ANGLE FROM HORIZ 90° DIRECTION —

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING
ADELAIDEAN	SADDLEWORTH FORMATION	Clay. grey, silty. Decomposed schist. Minor iron staining.					
		Clay. off-white. Altered schist. Minor plastic bands.		21	BW 1/75		
		No core recovered.		22		■	
		Clay. off-white. Altered schist. Minor plastic bands		23	BW 2/75		
		No core recovered.		24		■	
		Mixed clay and Quartzite		25			
		Quartzite. grey. Clayey zone at base		26	foliation at 20° to core axis.		
		Clay. off-white, slightly silty. Altered schist.		27	BW 3/75		
				28			
				29			
		Clay. pale green, silty. Altered schist.		30	BW 4/75		
		No core recovered.		31		■	
		Clay. off-white, silty, minor iron staining. Altered schist.		32	BW 5/75		
		Clay. off-white, silty and sandy bands, minor iron staining. Altered schist.		33			
				34			
				35			
		Quartzite. pale green, clayey		36			
		Clay. off-white, silty. Altered schist.					
		No core recovered.		37		■	
		Quartzite. pale green, clayey.		38			
		Schist. black and grey, biotite rich, abundant pyrite.		39			
				40			

REMARKS.

RAW MATERIALS DIVISION

DRILL NO 544 415 LOGGED.
TYPE Pioneer 160 D. Nichol
DRILLER W.T. Trestail DRAWN D.N.
START 10-6-74 TRACED AT
FINISH 14-6-74 CHECKED
SHEET 2 OF 3 DRG NO. 54.

NEWBOLD GENERAL REFRACTORIES LTD.

LOG OF DIAMOND DRILL HOLE

HOLE No. D.H.E. 5

~~SERIAL No.~~ .....

PROJECT S.A. Clay Deposits..... PLAN REFERENCE....9143.....

FEATURE Birdwood Clay Pit..... COORDINATES.....-.....

LOCATION Section 6397, hundred of Talunga, ANGLE FROM HORIZ..90°. DIRECTION..-.....

AGE	UNIT	DESCRIPTION OF CORE	LOG	DEPTH m.	STRUCTURES	CORE LOSS	CASING	DEPTH m.
ADELAIDEAN	SADDLEWORTH FORMATION	No core recovered.						
		Quartzite, grey.		41	foliation at 30° to core axis			41
		No core recovered.						
		Quartzite, pale grey. minor clay bands.		42				42
				43	foliation at 40° to core axis.			43
				44				44
		End of Hole 44·08 metres		45				45

REMARKS.

RAW MATERIALS DIVISION

DRILL No. S44. 415... LOGGED.....

TYPE Pioneer. 16.0.... D. Nichol.....

DRILLER. W.T. Trestail. DRAWN. D.N...

START. 10-6-74.... TRACED. AT...

FINISH. 14-6-74... CHECKED.....

SHEET. 3. OF. 3. DRG No. ..55...

APPENDIX B

Alumina contents of core samples

(results quoted on a dried basis)

R. FOWLER LIMITED.
LABORATORY

TEST REPORT

File No. 36/75

Birdwood, drill samples;

Field Number	Depth	Sample No.	% Alumina
1-75	DHE5 20.60-21.80	326	27.0
2-75	22.08-24.00	327	27.5
3-75	26.60-29.18	328	24.6
4-75	29.18-30.00	329	22.8
5-75	31.18-32.80	330	19.9
6-75	DHE3 11.10-12.00	331	32.9
7-75	DHE1 11.80-12.30	332	20.2
8-75	12.30-13.45	333	21.9
9-75	13.80-15.00	334	21.9
10-75	DHD5 5.50-9.10	335	24.6
11-75	DHD4 12.80-14.30	336	34.8
12-75	27.40-28.00	337	30.3
13-75	35.70-36.70	338	28.2
14-75	DHD3 5.50-6.65	339	32.5
15-75	6.65-7.00	340	29.8
16-75	7.00-9,00	341	32.1
17-75	9.00-12.80	342	34.7
18-75	12.80-14.00	343	29.2
19-75	14.00-15.20	344	32.8
20-75	16.00-17.15	345	34.8
21-75	17.15-18.70	346	33.9
22-75	18.70-19.30	347	36.3
23-75	19.30-20.80	348	36.3
24-75	20.80-21.20	349	38.1
25-75	21.30-22.50	350	34.8
26-75	26.25-27.50	351	35.1
27-75	27.50-28.70	352	34.8
28-75	29.30-30.85	353	35.1
29-75	30.85-32.60	354	37.6
30-75	34.50-35.60	355	28.9
31-75	35.60-36.50	356	26.6
32-75	DHC4 46.20-47.19	357	34.4
33-75	DHD2 1.80-3.60	358	20.4
34-75	4.80-6.20	359	19.9
35-75	7.80-10.50	360	19.6
36-75	10.80-12.75	361	19.1
37-75	14.80-20.70	362	19.7
38-75	22.70-23.50	363	20.4
39-75	24.80-27.50	364	19.2
40-75	28.70-29.30	365	18.2
41-75	31.70-33.00	366	18.3
42-75	DHC3 29.00-29.50	367	29.7
43-75	29.50-30.50	368	30.1
44-75	32.50-34.70	369	37.6
45-75	34.70-37.30	370	36.7
46-75	41.75-45.50	371	33.3
47-75	46.60-49.70	372	36.0

.../3

R. FOWLER LIMITED.
LABORATORY

TEST REPORT

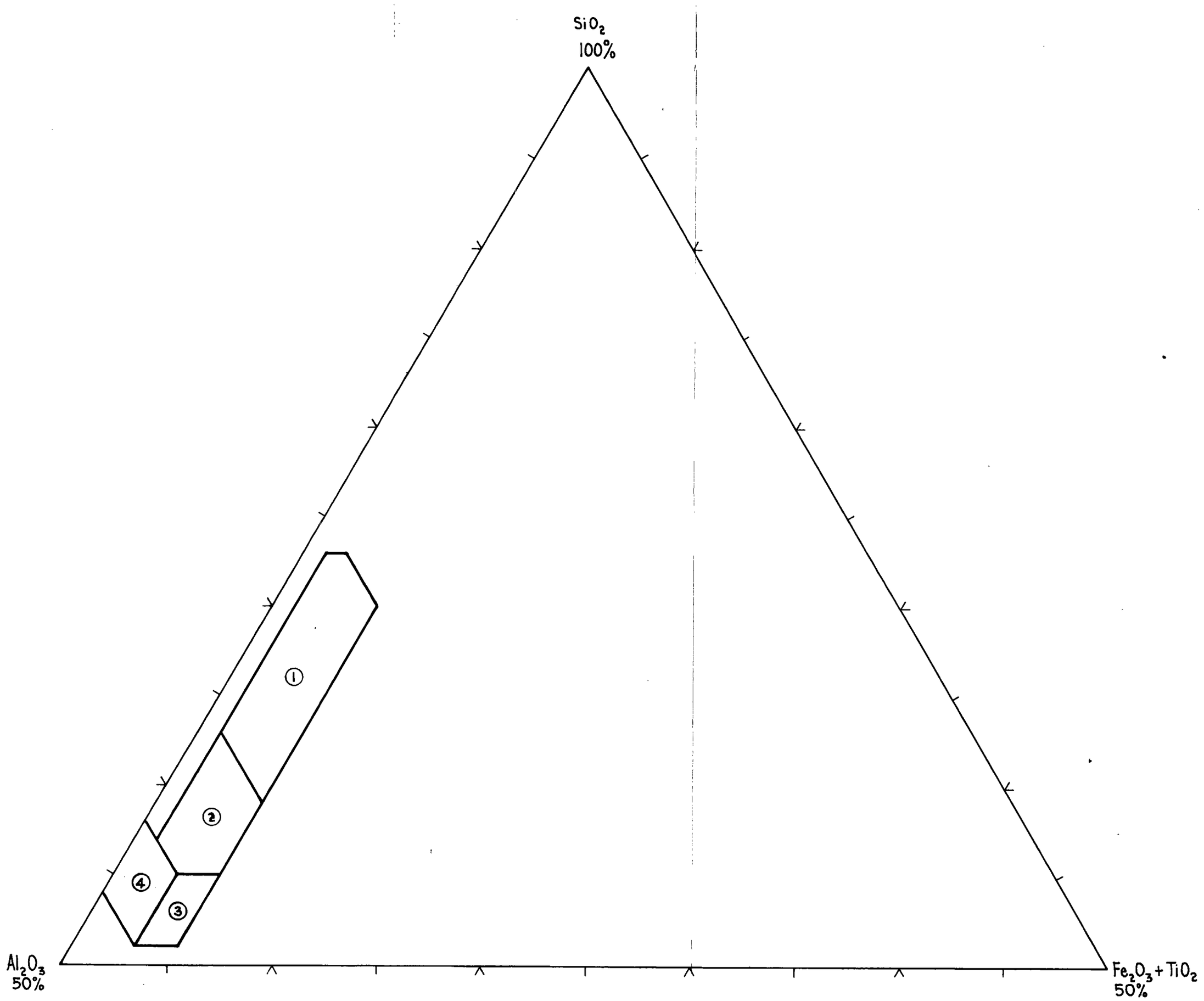
File No. 36/75

Birdwood, drill samples.

Field Number	Depth	Sample No.	% Alumina
48-75	DHD3 4.50-5.50	373	33.6
49-75	DHB5 24.90-25.50	374	23.2
50-75	30.94-31.70	375	31.5
51-75	32.70-33.79	376	31.8
52-75	33.79-34.75	377	35.9
53-75	34.75-35.55	378	34.8
54-75	35.55-35.99	379	29.5
55-75	37.80-38.59	380	24.1
56-75	39.20-40.10	381	34.4
57-75	43.60-44.00	382	28.6
58-75	44.60-45.40	383	30.6
59-75	46.75-47.29	384	29.7
60-75	DHC2 9.75-10.25	385	25.3
61-75	10.57-11.50	386	25.2
62-75	11.50-12.00	387	37.9
63-75	12.57-13.69	388	37.0
64-75	13.69-14.70	389	37.7
65-75	14.70-15.67	390	36.5
66-75	15.67-17.27	391	32.9
67-75	17.27-17.60	392	32.3
68-75	17.60-19.70	393	35.9
69-75	20.27-21.80	394	34.0
70-75	23.27-23.80	395	30.5
71-75	23.80-28.57	396	29.1
72-75	28.57-32.10	397	33.1
73-75	32.57-35.57	398	34.5
74-75	DHC1 2.00-3.55	399	22.6
75-75	3.55-4.95	400	21.9
76-75	4.95-6.22	401	23.9
77-75	6.62-7.40	402	24.4
78-75	7.95-10.20	403	25.5
79-75	10.95-13.30	404	25.6
80-75	13.95-16.95	405	20.4
81-75	16.95-18.80	406	20.7
82-75	19.95-20.95	407	20.3
83-75	20.95-21.75	408	20.7
84-75	26.65-27.65	409	20.6
85-75	29.65-31.35	410	20.9
86-75	32.65-35.00	411	20.7
87-75	35.65-38.65	412	21.4
88-75	DHB4 35.72-36.00	413	34.7
89-75	39.81-41.00	414	29.9
90-75	41.00-42.00	415	27.9
91-75	42.00-42.40	416	24.6
92.75	45.00-46.00	417	21.2
93-75	47.60-48.00	418	29.6

P.J. Raine,
CHIEF CHEMIST.

7.8.75



Field N° 1 - White Clay.
Field N° 2 - Fireclay.
Field N° 3 - Kaolin K1.
Field N° 4 - Kaolin K2.

Based on 281 analyses quoted on a calcined basis.

26448-1

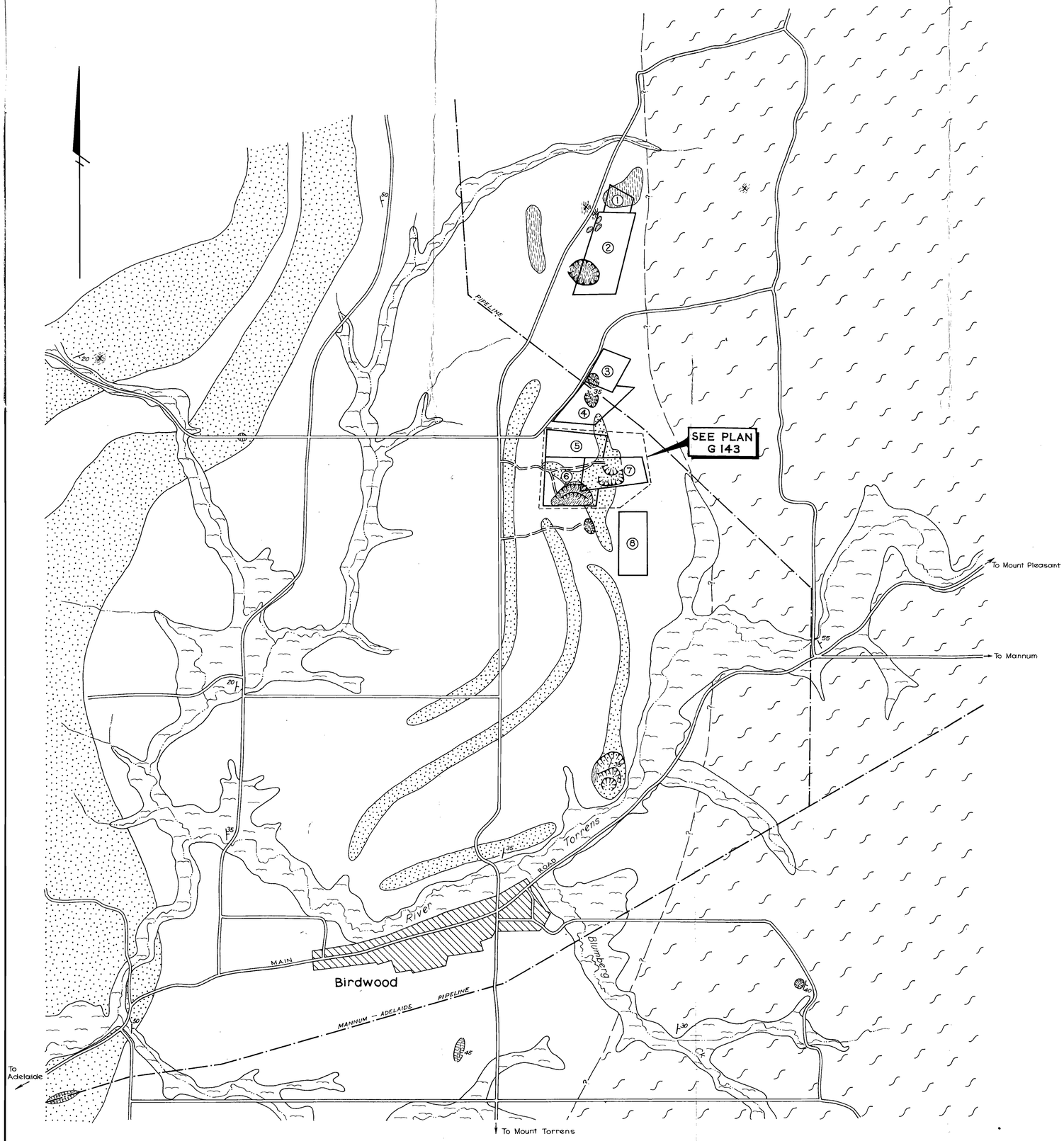
Newbold Raw Materials

A DIVISION OF NEWBOLD GENERAL REFRACTORIES LTD.

BIRDWOOD CLAY & SILICA QUARRY

COMPOSITIONAL FIELD DIAGRAM FOR QUARRY PRODUCTS

COMPILED:	DRAWN:	SCALE:	SHEET N°:
D. Nichol.	J. A. H.		S 27.
DATUM:	DATE: 23 Sept 1975	CHECKED:	



MINING TENEMENTS NEAR BIRDWOOD

REF Nº	TENEMENT & NUMBER	LOCATION		HOLDER		AREA (ha)	DATE	
		HUNDRED	SEC	NAME	ADDRESS		COMMENCED	EXPIRES
1	EML 4376	Talunga	4	PGH Industries Ltd	11 Harrison St, Renown Park, S.A.	3	18-6-74	17-6-81
2	EML 3611	"	4	"	"	16	1-7-73	30-6-82
3	EML 3410	"	1	Hallett Brick Industries Ltd.	Hallett St, Allenby Gardens, S.A.	4	1-7-73	30-6-80
4	EML 3601	"	1	Fargo Earthmovers Pty. Ltd.	323 Payneham Rd., Royston Park, SA.	6	1-5-74	30-4-81
5	ML 2994	"	1&6397	Newbold General Refractories Ltd.	82 Christie St, St. Leonards, N.S.W.	8	1-7-73	30-6-80
"	EML 4348	"	1&6397	"	"	8	10-12-73	9-12-80
6	ML 2951	"	6397	"	"	6	1-4-74	31-3-81
"	EML 4347	"	6397	"	"	6	10-12-73	9-12-80
7	ML 2917	"	6397	"	"	11	1-7-73	31-12-79
"	EML 4346	"	6397	"	"	11	10-12-73	9-12-80
8	Private Mine 231	"	6396	Hallett Brick Industries Ltd.	P.O. Box 6, Hindmarsh S.A.	10	2-5-74	—

LEGEND

Quaternary

Alluvium.

Kanmantoo Group

Quartzite – mica schists.

Burra Group

Mica schist.

Quartzite.

Weathered shale, white

Geological boundary

Strike and dip of bedding

Pit or quarry

Gold digging

Excavation

Road

Mining tenement boundary (approx)

Reference number

Pipeline

River or creek

SCALE

METRES 1000 0 1 2 KILOMETRES

Note:

This drawing was modified from Department of Mines – South Australia unpublished plan no. 72-161

2648-2

Newbold Raw Materials

A DIVISION OF NEWBOLD GENERAL REFRACTORIES LTD.

BIRDWOOD CLAY AND SILICA QUARRY

SECTIONS 1 & 6397 HD. TALUNGA

REGIONAL GEOLOGY & MINING TENEMENTS

COMPILED:	DRAWN:	SCALE:	SHEET Nº:
D. Nichol		1:1582 15,000	S 23
DATUM:	DATE: 10 Sept 1975	CHECKED:	

2648-2

EML 4348
ML 2994

EML 4347
ML 2951

EML 4346
ML 2917

SILICA QUARRY

CLAY QUARRY

Eddies Luck Shaft

Wickham Shaft

Wickham Shaft

Traav Shaft

OLD OPEN CUT

Access Tracks

Ramp

Waste

Silica Stockpile

Fireclay Stockpile Pad

K1 Stockpile

Ponds

French

DHE1 DHE2 DHE3 DHE4 DHE5

DHD2 DHD3 DHD4 DHD5

DHC1 DHC2 DHC3 DHC4 DHC5 DHC6

DHB2 DHB3 DHB4 DHB5 DHB6

DHA1 DHA2

DH1 DH2 DH3 DH7

A A' B B' C C' D D' E E' F F' G G' H H' I I' J J' K K'

LEGEND

- Pebbly clay, alluvium and soil units.
- Slate with minor quartzite bands.
- Quartzite.
- White clay-shale, white clay, and kaolinite.
- Discoloured red and yellow brown clay, low quality white clay-shale, decomposed mica schist and semi-siliceous schist.

- Geological boundary
- Strike and dip of foliation and bedding
- Contour, 2 metre interval. Arbitrary datum
- Quarry face
- Dump or stockpile
- Embankment
- Access track
- Fence
- Lease boundary and corner post
- Mine shaft
- Outline of underground workings
- Diamond drillhole no. D4 (This report) ● DHD4
- Diamond drillhole (Tarvydas, 1971) • DH2
- Cross-section. See plans 144a & 144b

SCALE

0 50 100 150

METRES

2648-3

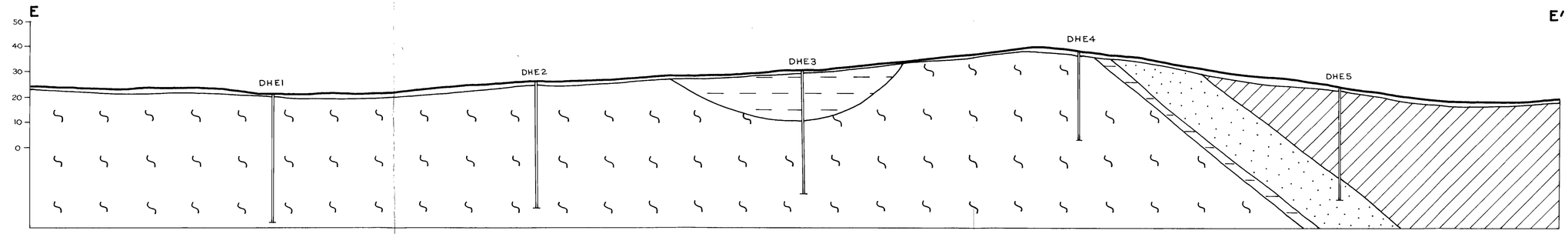
Newbold Raw Materials

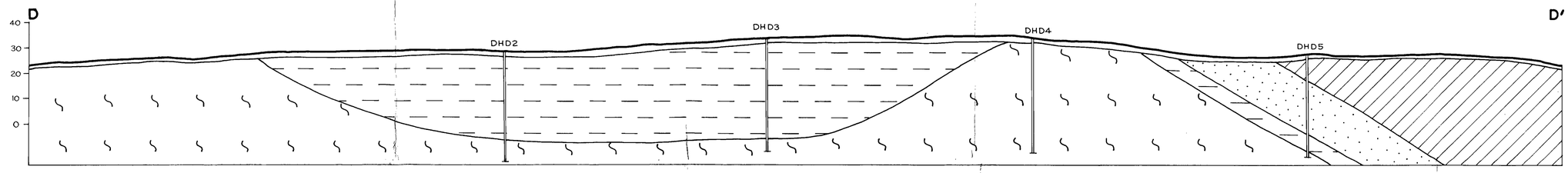
A DIVISION OF NEWBOLD GENERAL REFRACTORIES LTD.

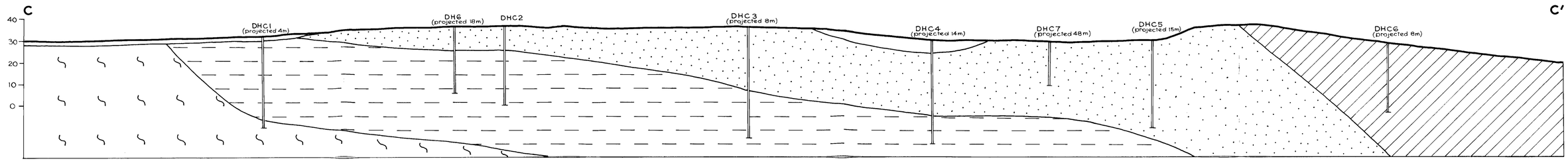
BIRDWOOD CLAY AND SILICA QUARRY
SECTIONS 1 & 6397 HD. TALUNGA
GEOLOGICAL PLAN

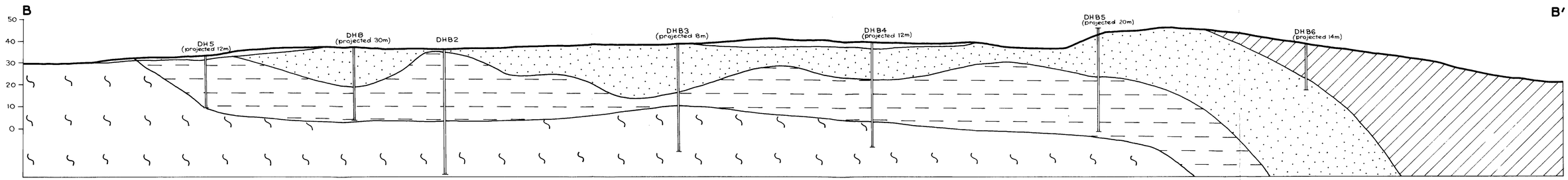
COMPILED: D. Nichol	DRAWN:	SCALE: 1:1000	SHEET NO: G143
DATUM: Arbitrary	DATE: 10 Sept. 1975	CHECKED:	

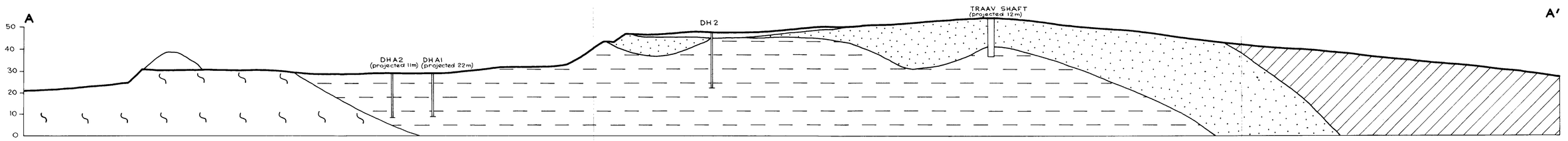
2648-3











Elevations shown in metres – arbitrary datum

For location of sections and legend see plan no. G143.

2648-4

2648-4

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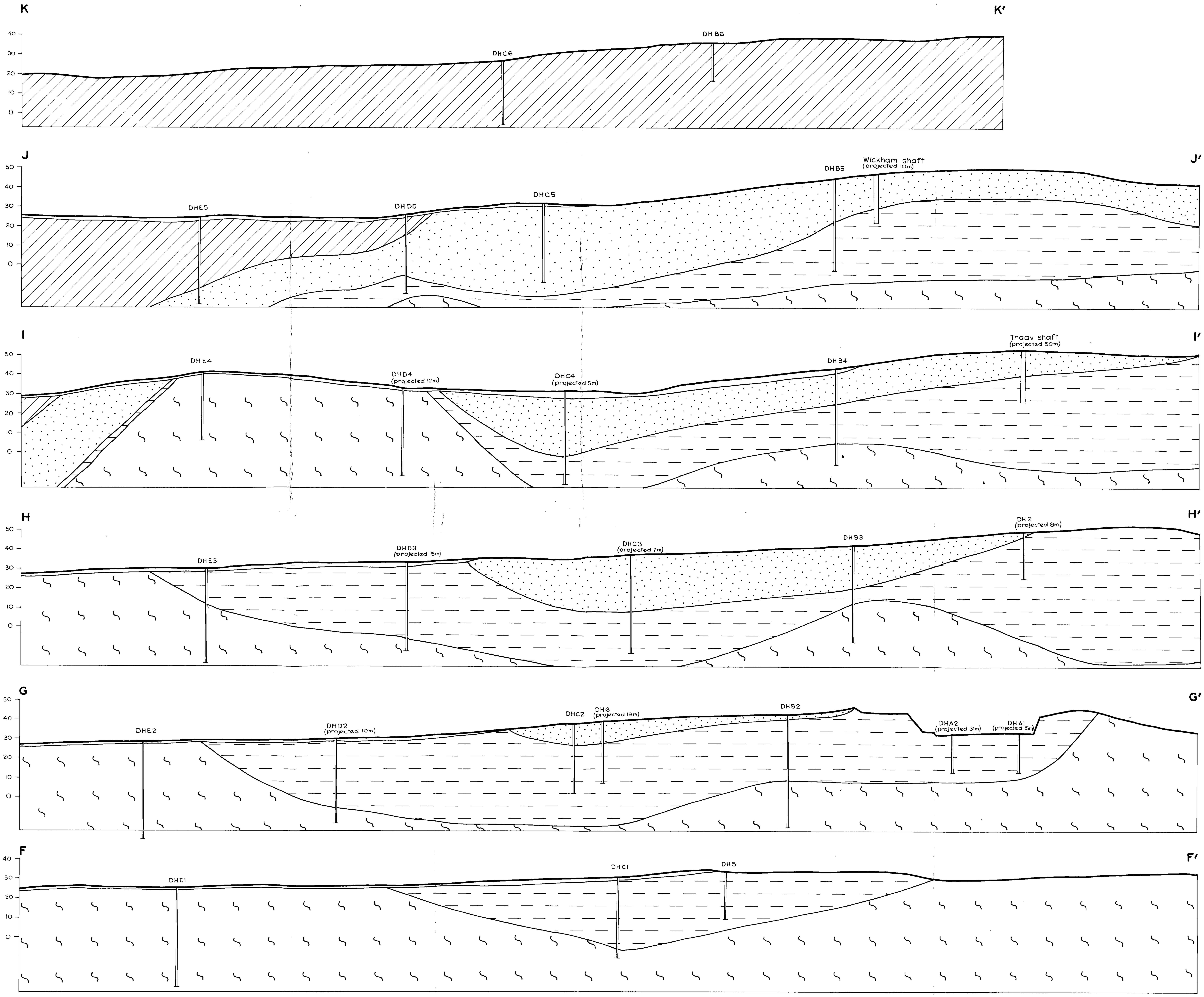
BIRDWOOD CLAY AND SILICA QUARRY

GEOLOGICAL SECTIONS A, B, C, D, E.

COMPILED: D. Nichol	DRAWN:	SCALE: 1:1000	SHEET NO: G144a
DATUM: Arbitrary	DATE: 10 Sept 1975	CHECKED:	



Elevations shown in metres — arbitrary datum.

For location of sections and legend see plan no. G 143.

2648-5

2648-5

Newbold Raw Materials

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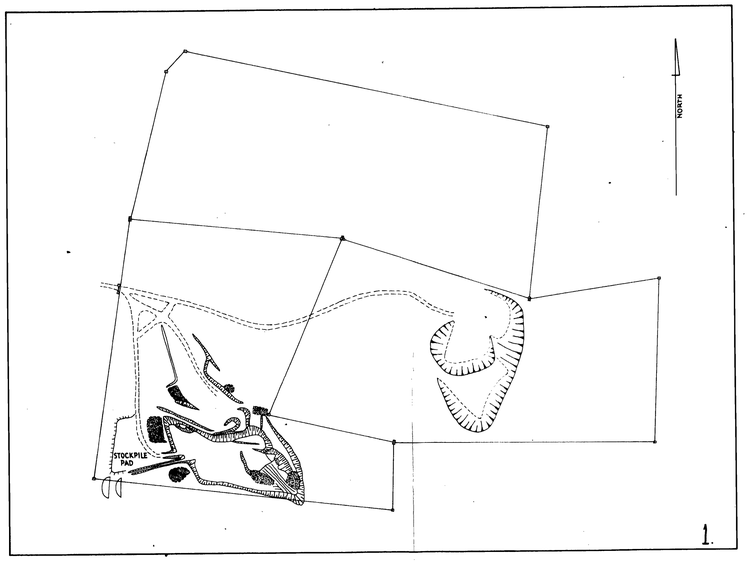
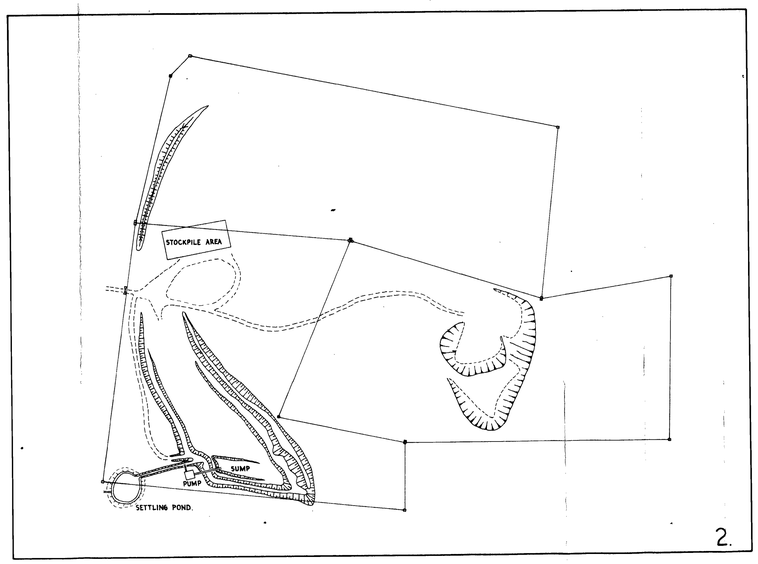
BIRDWOOD CLAY AND SILICA QUARRY

GEOLOGICAL SECTIONS F, G, H, I, J, K.

COMPILED:	DRAWN:	SCALE:	SHEET NO:
D. Nichol		1:1000	G 144 b
DATUM: Arbitrary	DATE: 10 Sept 1975	CHECKED:	



1.



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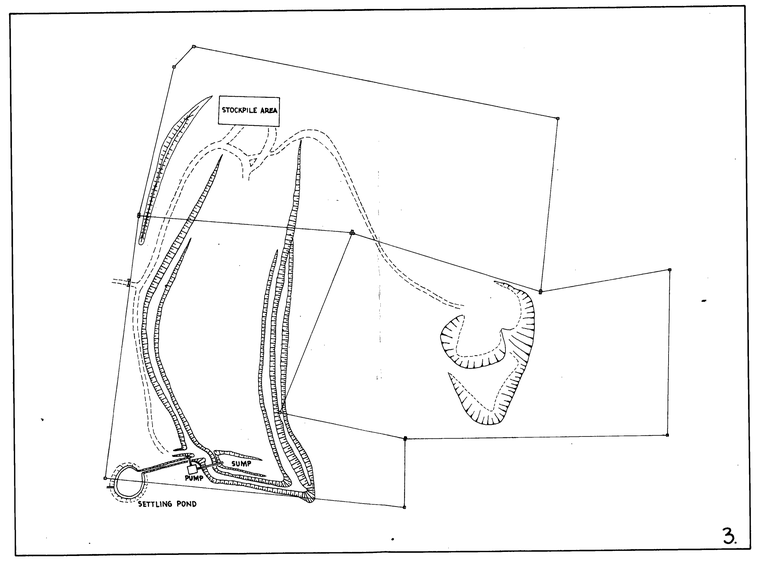

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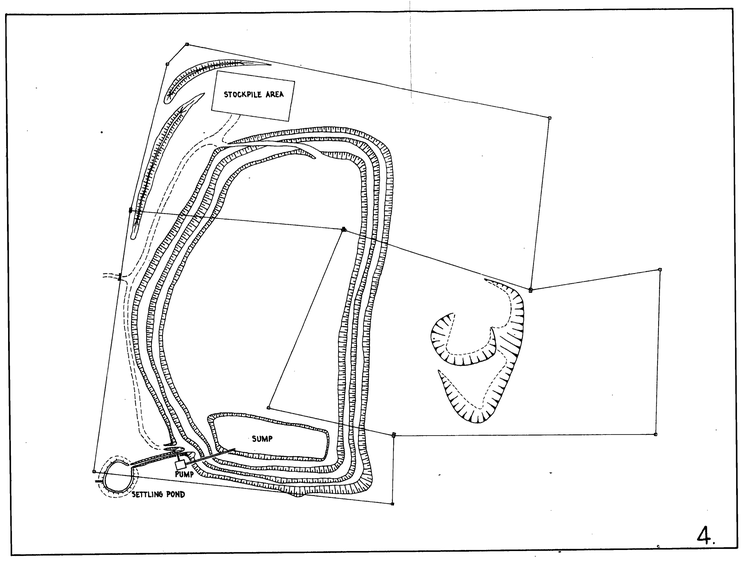

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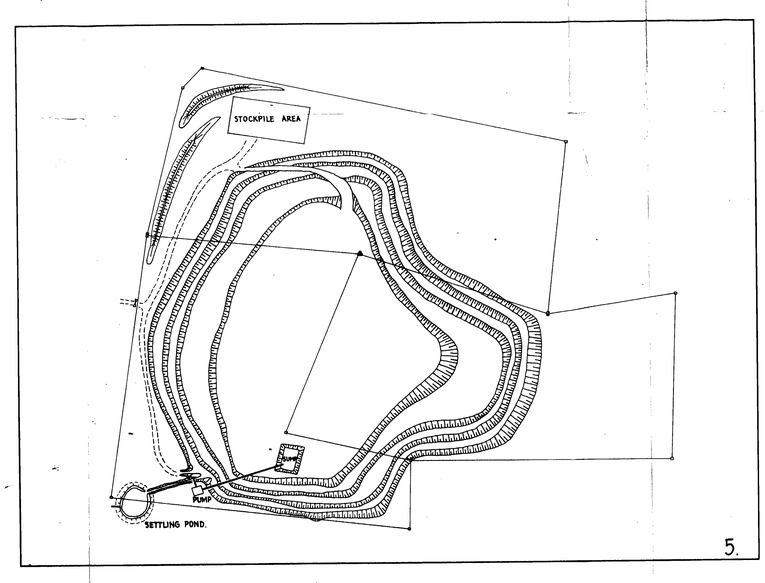

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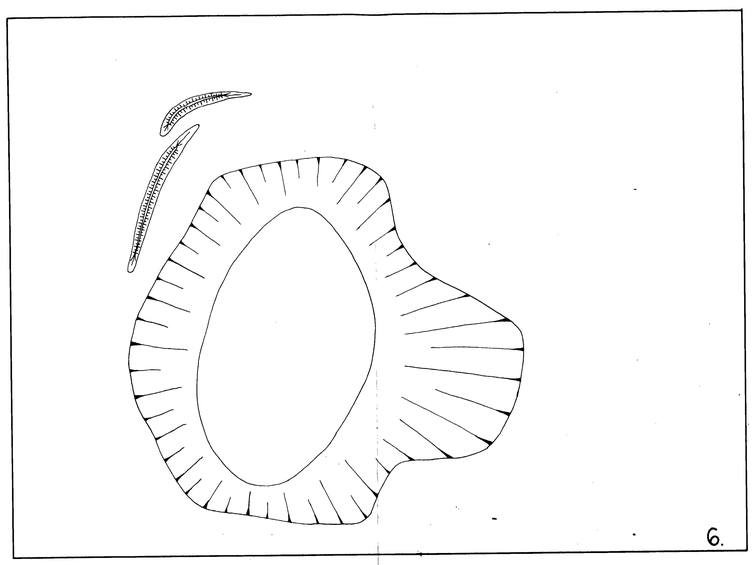

6.

LEGEND

- Track
- Lease peg & boundary
- Pit slope
- Waste heaps
- Barrier mound

2648-6

2648-6

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BIRDWOOD CLAY AND SILICA QUARRY DEVELOPMENT PLAN			
COMPILED: D. Nichol.	DRAWN: J.A.H.	SCALE: 1: 5000	SHEET No: G 145
DATUM: —	DATE: 28 Sept 1975.	CHECKED:	